REMEDIAL DESIGN REMEDIAL ACTION PLAN
FOR
RICHARDSON FLAT TAILINGS SITE

EPA SITE ID: UT980952840

December 11, 2007

Prepared for:

United Park City Mines
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1.0 INTRODUCTION

This Remedial Design/Remedial Action Plan (RD/RA Plan) presents design elements and activities for implementing the remedial alternative approved by the United States Environmental Protection Agency (EPA) at the Richardson Flat Tailings Site, Site ID UT980952840, (The "Site") near Park City, Utah. The Site is an inactive mill tailings impoundment owned by United Park City Mines Company (United Park). United Park has prepared this document pursuant to the Record of Decision (EPA, 2005) for the Site, dated July 6, 2005. A Site Location Map is presented on Figure 1-1.

This RD/RA contains elements to meet the requirements for both Remedial Design and Remedial Action Work Plans as described in "Guidance on EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties" EPA 540/G-90/001 (EPA, 1990). The RD/RA Plan is composed of the Remedial Design (RD) Plan and the Remedial Action (RD) Work Plan and includes the following sections:

Section 1 – Introduction
Section 2 – Site Description
Section 3 – Site Management

Part I: Remedial Design Work Plan (RD)
Section 4 – Field Sampling Plan
Section 5 – Remedial Design
Section 6 – Specifications
Section 7 – Operation and Maintenance Plan
Section 8 – Contingency Plan

Part II: Remedial Action Work Plan
Section 9 – Project Management

Section 10 – Schedule

Section 11 – Construction Procedures

Section 12 – Deliverables

Section 13 – References

1.1 Remedy Description and Overview

The selected remedy addresses mill tailings located in several areas of the Site, including the main impoundment (Area A), an area south of the diversion ditch (tailings south of the diversion ditch – Area B), and the wetlands west of the embankment. Other media addressed in the selected remedy are sediments and surface water located within the Site boundary. The mill tailings and other media are not considered principal threat waste; therefore, appropriate remedial actions for the waste include excavation of tailings in source areas with relocation to areas within the impoundment and containment of the tailings through capping. Additionally, the selected remedy allows for future disposal of Bevill-exempt mine waste from other remediation areas within the Park City area on the tailings impoundment and placement of restrictions on future land and groundwater use.

The remedy detailed in this RD/RA is specified in the Record of Decision (ROD) and was evaluated during the Focused Feasibility Study (FS, RMC 2004b) for the Site. The selected remedial alternative contains the following elements:

- Removal of contaminated materials in selected areas south of the South Diversion Ditch (referred to as Area B). Excavation would extend to the visual interface between the tailings and native soils in low lying areas subject to seasonal ponding or interaction with shallow ground water or to a depth where a clay soil cover can be placed;

- Removal of contaminated materials in the wetland west of the main embankment. This would include excavation of contaminated material to achieve the Site PRG of

310 parts per million (ppm) lead. This activity will only be performed after remedial activities are completed in the South Diversion Ditch;

- Placing excavated materials in the impoundment. The impoundment will be used by United Park and others to accommodate similar Bevill-exempt mine waste materials in the upper Silver Creek watershed;
- Placement of a minimum twelve-inch thick low permeability soil cover on areas where tailings are left in-place including the impoundment. The cover would be placed in six-inch lifts and machine compacted. Upon completion of the low permeability soil cover, a six-inch topsoil cover would be placed. The final surface cover will be a minimum of eighteen inches and surface will be graded to control surface stormwater runoff and drainage;
- Placement of twelve-inches of clean gravel over contaminated sediments in the South Diversion Ditch, including the pond located near the terminus of the ditch. Additional discussions with EPA and in consideration of potential Natural Resource Damages UPCM may remove contaminated sediments in the ditch and pond;
- Installation of a rock wedge buttress along the oversteepened portion of the embankment (for about 400 feet of the total embankment length of 800 feet);
- Regrading and revegetation of areas affected by remedial activities at the Site. Areas in which tailings were removed would be restored, where possible, to existing topographic conditions; and
- Monitoring Site conditions (vegetation and erosion) on a quarterly basis for two years. Surface water monitoring for cadmium, lead, zinc (total and dissolved) and hardness at the mouth of the diversion ditch and within Silver Creek up and down stream of the Site.

1.2 Summary of Previous Investigations

Since the 1970s, Park City Ventures (PCV), Noranda, EPA, and United Park have conducted numerous environmental investigations relating to the Site. These investigations are summarized in the Remedial Investigation (RI, RMC, 2004a) conducted by United Park. These investigations included Site characterization, tailings pond and embankment studies, surface water and groundwater studies. The reports and data from these previous investigations were very useful in determining the scope of additional investigative activities needed to bring final closure to the Site. Because past investigation activities by PCV, Noranda and United Park were performed without EPA oversight and with an unknown degree of QA/QC, the results from such investigations are incorporated into the RI as screening level data.

EPA proposed listing the Site on the NPL on two occasions. In 1988, EPA proposed listing the Site on the NPL. After considering public comments, EPA ultimately declined to list the Site by removing it from the proposed NPL. In 1992, EPA again proposed that the Site be placed on the NPL. Based on the new proposal to list the Site, the EPA Emergency Response Branch (ERB) conducted additional investigations on the Site and determined that conditions did not warrant emergency remedial action. In 1994, the Agency for Toxic Substances and Disease Registry (ATSDR) in their *Preliminary Public Health Assessment Addendum on the Richardson Flat Tailings* found that the Site posed "no apparent public health hazards due to past or present exposure." The EPA has yet to list the Site on the NPL, but the Site's listing on CERCLIS remains in effect.

United Park conducted a Focused Remedial Investigation and Focused Feasibility Study (RIFS, RMC 2004a & b). As part of the focused RIFS, soil, ecologic, surface and groundwater data were collected under EPA oversight and protocol. The key findings from the RIFS include the following:

- On-site soils data indicate that the tailings cover is greater than one-foot deep on the southern half of the impoundment, and more than six-inches deep on the northern half

of the impoundment. Except for a few localized areas, average lead concentrations in surface cover soils are less than 400 ppm with a range of 20 to 3,239 ppm. Arsenic, average concentrations in surface cover soils are less than 22 ppm with a range of <5.0 to 121 ppm. Data collected from soils in areas outside of the tailings impoundment area indicate the extent of wind-blown tailings is generally limited to areas immediately adjacent to the tailings impoundment area.

- Surface and shallow groundwater samples were collected from an adjacent and upstream area owned by United Park, referred to as the "Floodplain Tailings" area, to evaluate shallow groundwater and surface water conditions in and near Silver Creek. The data collected in this evaluation of Silver Creek was also used to evaluate Silver Creek as required in the AOC. The data demonstrate that offsite sources of metals contamination appear to be impacting surface and groundwater quality in and near Silver Creek upstream and westerly of the Richardson Flat tailings impoundment. Water elevation and water quality data indicate that the Floodplain Tailings appear to be contributing some, but not all, of certain metals contamination to Silver Creek surface and groundwater systems in the area adjacent to and within Silver Creek west of the main Richardson Flat impoundment. Other sources of metals contamination located upstream of the Site are also impacting water quality in Silver Creek, as well. The Floodplain Tailings are part of the Upper Silver Creek Watershed Investigation and will be remediated in that process. Water elevation and water quality data indicate that Silver Creek is impacting a portion of the wetland area adjacent to the main embankment. Further investigation and remediation of the Floodplain tailings will be conducted as part of Silver Creek remedial efforts and are not considered as part of this RD/RA Plan.

- Groundwater at the Site has been detected in tailings both inside and outside of the impoundment area, in shallow alluvial aquifers beneath the Site and in the Silver Creek alluvial aquifer. Based on hydrogeologic studies, there appears to be no hydraulic connection between the groundwater found in the impounded Richardson Flat tailings and in the underlying shallow aquifers or within the Silver Creek alluvial

aquifer. Groundwater quality data indicate that the alluvial aquifer underlying Silver Creek is not chemically similar to groundwater encountered in the tailings, or to surface water in the South Diversion Ditch.

- Sample data show that the diversion ditch and wetland sediments contain metals at all locations sampled, and that a transfer of metals from the sediments to surface water does not appear to be occurring within the diversion ditch and wetland area.

- Data indicate there are more alkaline-generating compounds than acid-generating compounds in the tailings. The average pH of the tailings is 7.5 S.U. Thus, under current operating conditions, it is unlikely that the tailings will become acidic. Data obtained from unsaturated tailings indicate that metals, such as lead and zinc, have a potential to leach from tailings under unsaturated conditions. However, groundwater data collected from wells completed in tailings at the Site suggest that any metals that may have previously leached from unsaturated tailings would have since become immobilized upon encountering underlying saturated tailings.

Data collected during the RI was used to develop and screen technologies and process options as required by the National Contingency Plan (NCP), five remedial alternatives were evaluated as part of the Focused FS. The remedial design presented in this RD/RA is primarily based on data collected by United Park during the RIFS and is detailed in the feasibility study portion of the RIFS.

1.3 Record of Decision Summary and Requirements

The ROD presents the selected remedy for the Richardson Flat Tailings Site. The ROD was developed in accordance with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, 42 U.S. Code (USC) §9601 et. seq. as amended, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300. The decision is based

on the Administrative Record for the Site. The remedy was selected by EPA Region 8 and with concurrence from the Utah Department of Environmental Quality (UDEQ).

The response action selected in the ROD is necessary to protect public health and the environment from actual or threatened releases of hazardous substances into the environment. Such a release or threat of release may present an imminent and substantial endangerment to public health or welfare or the environment.

The ROD document presents a detailed synopsis of activities at the Site and contains sections detailing the following subjects:

- Section 1 - Description of the Site,
- Section 2 - Site history and Enforcement Activities,
- Section 3 - Community Participation,
- Section 4 - Scope and Role of the Operable Units,
- Section 5 - Summary of Site Characteristics,
- Section 6 - Current and Potential Future Land Use,
- Section 7 - Summary of Site Risks,
- Section 8 - Remedial Action Objectives,
- Section 9 - Description of Alternatives,
- Section 10 - Summary of Comparative Analysis of Alternatives,
- Section 11 - Principal Threat Waste Description,
- Section 12 - Selected Remedy Description, and
- Section 13 - Statutory Determinations.

1.3.1 Statutory Determinations

The ROD selected a remedy that is protective of human health and welfare, and the environment, complies with federal and state requirements that are applicable or relevant and appropriate for the remedial action, is cost effective and utilizes permanent solutions and alternative treatment technologies to the extent practicable.

The remedy will result in hazardous substances, pollutants or contaminants remaining on Site above levels that allow for unlimited use and unrestricted exposure. Institutional controls such as deed restrictions limiting land use will be permanently placed on the title to the property. A statutory review will be conducted within five years after initiation of the Remedial Action to ensure that the remedy is, or will be, protective of human health and the environment.

1.4 Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA requires that remedial actions comply with state and federal applicable or relevant and appropriate requirements (ARARs), as defined below, unless a waiver is justified under Section 121(d)(4) of CERCLA. ARARs are used to assist in determining the appropriate extent of Site cleanup, to scope and formulate remedial action alternatives, and to govern the implementation of a selected response action.

ARARs for the Site in each of the three categories (chemical-specific, location-specific, and action-specific) are summarized in Table 1-1. The Action Specific hazardous waste ARARs are not applicable to Bevill-exempt solid waste. All of the mine waste at the Site, and any mine waste that is transported from other Park City mining areas to the Site most likely is or will be Bevill-exempt solid waste (EPA, 2005).
ARARs identified herein became final upon issuance of the ROD by EPA.

1.5 Natural Resource Damages

The National Contingency Plan (NCP) and CERCLA provide a mechanism for any federal natural resource management agency to seek compensation for damages to natural resources from un-permitted releases of hazardous substances. Natural Resource Trustees are any federal natural resources management agency designated in the NCP and any state agency designated by the governor of each state, or an Indian tribe (DOI, 1986). The potential trustees for the Site include:

- U.S. Department of Interior (represented by the USFWS)
- Utah Department of Environmental Quality

No Indian Tribes have been identified as potential trustees for natural resources found on the Site.

On February 16, 2006, EPA provided notice to the DOI pursuant to section 104(b)(2) of CERCLA regarding the final remedy for the Site. On June 16, 2006 the USFWS provided a letter to United Park concerning potential Natural Resource Damage(NRD) claims. The letter outlined initial concerns the USFWS may have relating to Natural Resource Damages (NRD) occurring from the placement of mill tailings at the Site. The June 16, 2006, USFWS letter set forth preliminary views on potential damages and proposed a path forward for continuing dialogue relating to potential natural resource damage claims at the Site. The USFWS has suggested that a cooperative approach be taken to define potential natural resource damages, how restoration of trust resources can be combined with the remedy and how restoration work can be credited to United Park.

It is United Park's goal to combine implementation of the remedy outlined in ROD and selected by EPA and restoration of natural resources at the Site. This work will be accomplished simultaneously, however, discussions with Natural Resource Trustees over potential damages are likely to be completed after the remedy consent decree is approved by EPA. In anticipation of a timing problem United Park proposes provisions in this Remedial Design for consideration of potential natural resource claims.

In addition to the remedy specified in the ROD it is anticipated that the following restoration actions will be taken concurrent with implementation of the remedy:

1. Contaminated sediments in the South Diversion Ditch and pond located at the terminus of the ditch will be excavated and placed in the impoundment area. Wetland habitat in the ditch and pond will be restored to baseline or better conditions.

2. A wetland will be constructed in conjunction with source removal activities adjacent to the South Diversion Ditch (see, Figures 5-4 and 5-5).
3. Two wetlands will be constructed south of the county road adjacent to the east source removal area (see, Figure 5-4 and 5-5).
4. The ten acre seasonally wet area on the impoundment will be restored to its current condition (see figure 5-1, Sheet 2).

Construction of additional wetlands during implementation of the remedy and restoration of existing wetlands (South Diversion Ditch) will increase wetland habitat, further improve surface water quality at the Site and will provide compensation for potential Natural Resource Damage injuries.

2.0 SITE DESCRIPTION

This section provides a summary of Site conditions and features. The property is owned by United Park and consists of approximately 650 acres in a small valley in Summit County, Utah, located one and one-half miles northeast of Park City, Utah. The Site lies within the northwest quarter of Section 1 and northeast quarter of Section 2, Township 2 South, Range 4 East, Summit County, Utah (Figure 1-1). Figure 2-1 shows Site configuration, topography and other pertinent features.

2.1 Surrounding Land Use

Surrounding land use consists of primarily private open lands and public roads. No residential properties are located adjacent to the Site.

2.2 Site Characteristics

The tailings impoundment covers approximately 160 acres in the northwest corner of the property. The Study Area Boundary as determined in the RI (RMC, 2004a) contains the tailings impoundment as well as adjacent areas impacted by historical use of the Site and

is presented in Figure 2-1. Approximately 263 acres are contained within the Study Area Boundary.

The Site is located at an elevation of approximately 6,600 feet above sea level and consists of a geometrically closed tailings impoundment contained by an earthen dam on the west side and two surface water run-on diversion ditches on the north, south and east sides. The South Diversion ditch flows into a wetland abutting Silver Creek. The area surrounding the impoundment consists of valley bottom topography surrounded by rolling hills.

3.0 SITE MANAGEMENT

This section discusses Site management and access responsibilities.

3.1 Management Responsibilities

Kerry Gee will be the Project Coordinator for United Park and will manage the remedial action. Environmental consultants at Resource Management Consultants, Inc. (RMC) and civil engineers, land planners and surveyors from Alliance Engineering in Park City, Utah, will assist Mr. Gee where needed. The EPA Project Manager will be Kathryn Hernandez. Site management is presented on Figure 3-1. Appendix A contains the contact information for the Remedial Action. Geary Construction of Coalville, Utah has been selected as the primary earthwork contractor however, some of the work may be completed by United Park personnel or outsourced to a qualified and experienced contractor. All personnel and contractors working with contaminated materials will have appropriate health and safety training including OSHA certification as required by 29 CFR 1910.120.

3.1.1 Independent Quality Assurance

Project Quality Assurance will be conducted by qualified personnel independent and autonomous from the remedial contractor. Environmental Quality assurance will be conducted by RMC. Engineering Quality Assurance will be conducted by Alliance Engineering.

3.2 Site Control and Access

Richardson Flat is a private parcel of land with areas of controlled access. An-unpaved county road passes through a portion of the Site, outside of the impoundment area. Motor sports enthusiasts use portions of the Site located south of the impoundment and county road. Site control and access will be the responsibility of the United Park Project Coordinator or designated representative. The project coordinator will ensure that no unauthorized visitors enter the construction area and will also ensure that appropriate training requirements are met. Signs will be posted alerting the general public of the remedial work and alternate travel paths when required.

PART I: REMEDIAL DESIGN AND REMEDIAL DESIGN WORK PLAN (RD)

This part includes the required elements of the Pre-Final/Final Design review as described in Section 4.2.5, "Guidance on EPA Oversight of Remedial Designs and Remedial actions performed by Potentially Responsible Parties" EPA 540/G-900/001. Elements presented in this Part include: Field Sampling and Construction Quality Assurance Plan, final design plans and specifications, Operation and Maintenance Plan and Contingency Plan.

4.0 FIELD SAMPLING PLAN

A Field Sampling Plan (FSP, RMC, 2005) describing sampling and data gathering methods to be used during construction and post-construction monitoring for Remedial Activities has been prepared for the Site. The FSP will be the basis for conducting sampling activities and will be the basis for ascertaining whether the performance standards have been achieved by the Remedial Action.

The FSP will include Data Quality Objectives (DQOs) which will guide the sampling process and design. The DQOs for the Site include:

- Determine if water discharging from South Diversion Ditch continues to meet existing water quality standards;
- Confirm that the wetland sediment PRG for lead (310 ppm) is achieved;
- Confirm that Site air quality meets NAASQ and OSHA standards during remediation;
- Confirm that native soils remaining in source removal areas are not contaminated (lead <500 ppm and arsenic <100ppm);
- Confirm soil cover meets design specifications (lead <500 ppm and arsenic <100ppm); and
- Confirm that the Remedial Action is complete and the Site is functioning as designed (erosion and vegetation monitoring).

A Construction Quality Assurance Project Plan (QAPP) is included as part of the FSP. The QAPP includes a description of activities that will be used to monitor and control field activities and construction quality. The QAPP describes the Site specific

components of the Quality Assurance Program. The purpose of the QAPP is to ensure with a reasonable degree of certainty, that the completed project meets the design criteria and project specifications.

The FSP is included as Appendix B of this Plan.

5.0 REMEDIAL DESIGN

This section details the individual design elements for the Site.

5.1 Impoundment

Design elements for remedial activities on the impoundment include:

- A portion of the impoundment will be used as a repository for source materials excavated as part implementing this Remedial Action, similar Bevill-exempt solid wastes from United Park properties and other projects in the upper Silver Creek watershed. The repository area is shown on Figure 5-1. Placement and grading of the repository materials will be used to raise the elevation of that portion of the impoundment to decrease surface water infiltration into the tailings materials. It is anticipated at this time that approximately 1,000,000 cubic yards of material will be brought into the impoundment area. The placement of material will be from the west to the east in lifts not more than three feet in height. This will give the best opportunity for pressure equalization within the impounded tailings to occur. A portion of the northerly area of the pond, will be raised in elevation with the placement of fill generated from projects involved in the remediation of Bevill-exempt waste materials located in the general Park City area and Silver Creek Watershed. This area is immediately north of the proposed Park and Ride and recreational facility.

- In the Southeast portion of the impoundment, a 30 acre portion of the impounded area has been set aside for the construction of a Park and Ride facility for use by the general public and several soccer and softball fields. A conceptual plan for this 30 acre parcel is shown in Figure 5-1, Sheet 2. This figure shows the approximate layout of the parcel and its general location with the impoundment. Additional design features and a management program will be submitted as this use develops.

- The surface design of the impoundment will include a final grade at approximately one-half to two-percent to convey stormwater runoff to a portion of the South Diversion Ditch constructed in native materials. A series of drainage channels (Figure 5-1, Sheet 2) will be installed to collect overland flow and convey it to the South Diversion Ditch and to the impoundment wet area. Drainage swales will be built as required to convey surface drainage. Drainage for the Park and Ride facility will be contained within the 30 acre parcel, a sediment/stormwater retention pond will contain the design event stormwater from the Park and Ride facility.

- The seasonally wet area located in the northern portion of the Impoundment (Figure 5-1) will be covered with additional cover to bring the amount of cover to a minimum of 18". The area may be surrounded by a swale to direct and control the amount of runoff received. An additional drainage ditch will be constructed to intercept flow from the North Diversion Ditch and redirect it to the seasonally wet area to support wetland habitat. This area will be designed to accommodate surface flow from a 100 year, 24 hour rainfall event (approximately four inches). When restored this area could be used as compensation for potential Natural Resource injuries.

- A series of piezometers have been installed (Spring 2006) to assess tailings pore pressures from the placement of fill on the top of the impoundment.

- An eighteen-inch cover consisting of twelve-inches of low permeable clay soil with an additional six-inches of vegetative topsoil will be placed on all mine wastes in the impoundment. The low permeable clay soil will be compacted with tracked

equipment. The final soil cover depth on the impoundment will be a minimum of eighteen-inches.

- All disturbed areas will be revegetated.

A design detail of the impoundment area is presented in Figure 5-1. Typical cover design detail is presented in Figure 5-2. Typical drainage ditch design is presented in Figure 5-3.

5.2 Tailings South of the Diversion Ditch

The primary design elements for the tailings south of the diversion ditch are:

- Removal of tailings from major source areas. Tailings will be removed from low lying areas subject to seasonal ponding or interaction with shallow ground water which may have the potential to contribute to surface and groundwater impacts. The excavated tailings will be transported to the impoundment. Drainage will be restored to the pre-tailings topography to the extent practical.

- Remaining areas of tailings will be covered with eighteen-inches of soil consisting of twelve-inches of low- permeability clay soil with an additional six-inches of vegetative topsoil. The low permeability clay soil cover will be compacted with tracked equipment.

- A wetland will be constructed in conjunction with source removal activities in the western source removal area (Constructed Wetland 1, Figures 5-4 and 5-5). After tailings removal the area will be graded to accommodate flow from the South Diversion Ditch. This will increase Site wetland habitat and increase the retention time for water flowing through uncontaminated wetland portions of the Site, which will improve water quality. Flow through the wetland will be controlled by a diversion head gate or similar structure installed in the South Diversion Ditch. Flow

exiting the wetland will be routed back into the South Diversion Ditch. Wetland habitat created by the source removal will compensate for potential Natural Resource injuries.

- Two wetlands will be constructed south of the county road the Parking Lot Wetland and the Cottonwood Wetland, Figures 5-4 and 5-5). These wetlands will increase the amount of wetland habitat at the Site. and will be constructed in an area that does not contain tailings but may be contiguous to remediated areas. The source of water for these wetlands at this time will be snowmelt and stormwater runoff from the watershed south and west of the Site. It may be possible that shallow groundwater may provide a more long-term source of water to the wetlands. Velocity dissipation and flow direction structures constructed of rip-rap or similar material will be placed as necessary. The Parking Lot wetland will drain into the Cottonwood wetland. Soil removed during the Parking Lot wetland construction will be used as topsoil where applicable. These wetlands may be used for compensation to potential Natural Resource injuries.

- The east source removal area located south of the diversion ditch (Figure 5-4) will contain constructed channels and wetland features to distribute surface water and enhance wetland features. North of the county road a drainage channel will be constructed and lined, if necessary, with rip-rap material to allow for surface water flow to the South Division Ditch. This channel will be located in the approximate area of the pre-existing channel that provided drainage from the culvert crossing the road. The channel will be sized to accommodate the flow capacity of the current channel. South of the county road tailings will be removed from low lying areas subject to seasonal ponding or interaction with shallow ground water which may potentially contribute to surface and groundwater impacts. This location is referred to as the Cottonwood Wetland and water control features such as berms, swales and channels will be constructed to distribute surface water and enhance and increase wetland habitat over the removal area. This area will drain to the previously described culvert beneath the county road.

- It will be necessary to construct two crossings over the South Diversion Ditch to connect areas outside of the diversion ditch during source removal activities. One of these crossings will be in the form of a galvanized steel culvert or a corrugated plastic pipe and will be installed under compacted fill. This crossing will be removed after remediation construction. The second will be made of steel reinforced concrete and will remain in place to provide access to the Park and Ride and recreation parcel. Figure 5-6 is a typical representation of the installation of these crossings.

- All disturbed areas will be revegetated.

Design details of the tailings south of the diversion ditch area is presented in Figure 5-4. Cover design details are identical to those presented for the impoundment in Figure 5-2. Constructed wetland design details are presented in Figure 5-5.

5.3 South Diversion Ditch

In June of 2006 it was decided to modify the Record of Decision to allow for the removal of the contaminated sediments located in the bottom of the diversion ditch. These sediments will be removed and placed within the impoundment. Soil will be place in the bottom of the diversion ditch where necessary to promote vegetation growth.
The diversion ditch will be restored to pre-removal configuration and habitat conditions. Restoration of wetland habitat in the south diversion ditch will be compensation for potential Natural Resource injuries.

A cross-sectional design detail of the South Diversion Ditch is presented in Figure 5-3.

5.4 Wetland Area between the Main Embankment and Silver Creek

In the summer of 2005, the Utah Department of Transportation (UDOT) reconstructed Silver Creek in the wetland beginning at the old railroad grade and ending at the culvert

under State Highway 248. This action appears to have effectively drained the wetland. As soon as practical, a small ditch will be constructed in the wetlands with the intent of carrying water emanating from the diversion ditch to Silver Creek. This will facilitate the water flow through the majority of the wetland so that remediation construction can occur more efficiently. Remediation in this wetland will follow remediation of the South Diversion Ditch. Figure 2-1 shows the wetland area located between the main embankment and Silver Creek. EPA established a sediment PRG for lead at 310 ppm. Removal of sediments in the wetland will use this PRG as an "Action Level". Wetland sediments exceeding 310 ppm lead will be excavated and placed in the tailings impoundment. Prior to and during excavation, samples will be collected at six-inch depth intervals on 100 foot centers and analyzed for lead.

Upon completion of sediment removal the wetland will be designed and constructed to function in as close a capacity to its current configuration as possible prior to the UDOT construction. Design elements of the wetland include:

- Reconstruction of surface water flow features. Inflow from Silver Creek and the South Diversion Ditch will be dispersed in a series of sub-channels to provide sufficient water for the establishment of wetland habitat.

- Velocity dissipation and direction flow structures constructed of Rip-Rap or similar material will be placed as necessary to develop wetland hydrologic conditions. Rip-rap material will consist of clean well graded six-inch minus material.

- Restoration of wetland habitat. The area will be revegetated with plants typical of local wetland habitats. As much as possible and depending on availability, wetland plant species identified during the RI investigations will be used in the plant list. A wetland plant species list is included in Appendix C.

Wetland area design and construction details are presented in Figure 5-7.

5.5 Embankment Wedge Buttress

The wedge buttress will be designed to provide additional stability to the current embankment. The buttress design is based on an embankment stability study performed by Applied Geotechnical Engineering Consultants, Inc. (AGEC, 2001) presented in Appendix D. Design elements of the wedge buttress will include:

- Clear and grub the footprint of the wedge buttress of all vegetation and unstable materials;

- Abandon the monitoring wells along the embankment. An attempt should be made to either pull casing or drill it out and plug with a cement/grout mixture as these wells could be a source of water seepage under the wedge;

- Slope the base of the buttress towards the wetland at a five-percent slope;

- The initial base layer of the buttress will be keyed into the natural soils approximately twelve-inches below the toe of the tailings embankment;

- Material comprising the initial base layer will consist of well-graded rock with no soil. This layer will be placed twelve-inches deep the entire width and length of the wedge buttress. Size of this material will be three-inch minus and well graded. The volume for the base layer is approximately 385 cyds; and

- Overlying the base layer will be approximately 6,385 cyds of four-inch minus rock.

The embankment wedge buttress design and construction details are presented in Figure 5-2. The wedge buttress location is presented in Figures 5-1 and 5-7.

5.6 X-Ray Fluorescence Field Screening

A portable X-Ray Fluorescence meter (XRF) will be used to conduct field screening of soils and sediments. The XRF will be used to provide real-time data analysis of metals concentrations in on-site and imported materials. Final confirmation samples will be sent to a laboratory for analyses. The FSP (Appendix B) describes how the XRF will be calibrated and used during remedial activities.

If necessary, samples will be dried and screened prior to XRF analysis. Drying methods will include air drying and/or the use of a microwave oven.

5.7 Confirmation Sampling

Confirmation sampling will be conducted to determine that remedial activities are complete. Confirmation samples will be collected using procedures and analytical methods detailed in the FSP (Appendix B). Five-percent of all soil samples will be submitted to the laboratory to confirm XRF results. Sample locations are presented on Figure 5-8.

5.7.1 Wetland Area

Sampling will be conducted to confirm that remediation has been completed in sediments and that the lead PRG of 310 ppm has been achieved where applicable. Confirmation sampling in the wetland area will be conducted on grid consisting of 100 foot centers. Samples will be collected at a depth of zero to six-inches and analyzed for lead. Sampling protocol and analytical methodologies are described in the FSP (Appendix B). Sample locations are presented on Figure 5-8.

5.7.2 Tailings South of the Diversion Ditch

Confirmation sampling will be conducted using the XRF on a grid located on 200 foot centers in source removal areas located south of the diversion ditch Laboratory samples will be analyzed for arsenic and lead. Sampling protocol and analytical methodologies are described in the FSP (Appendix B). Sample locations are presented on Figure 5-8.

5.7.3 Cover Thickness

Following cover placement the thickness of of clean cover will be measured. If necessary, a hand coring tool will be used to measure thickness with minimal disruption to the cover. Data will be collected on a grid located on 200 foot centers. If cover thickness is inappropriate additional sampling and cover placement will be conducted. Sampling protocol and analytical methodologies are described in the FSP (Appendix B). Sample locations are presented on Figure 5-8.

5.7.4 Imported Materials

Imported soils will be screened with the XRF. In addition a five sub-sample composite will be collected for every 5,000 cyds and submitted to the laboratory for lead and arsenic analysis. All cover and topsoil will contain less than 500 ppm lead and 100 ppm arsenic. Sampling protocol and analytical methodologies are described in the FSP (Appendix B).

5.8 Air Monitoring Plan

Site air monitoring is addressed in Section 11.1.1. If required, additional air monitoring locations and/or additional BMP's will be established to reduce the offsite migration of contaminants. Air monitoring will be conducted according to procedures outlined in Section 11.1.1 and Section 4.4.5 of the FSP.

6.0 SPECIFICATIONS

This section details material and construction specifications for Site activities during Site remediation.

6.1 Topsoil

Topsoil will be screened to remove particles greater than six-inches and will be suitable to support vegetation. Topsoil will placed to a minimum depth of six-inches and will contain sufficient organic matter and nutrients to ensure that revegetation efforts are successful.

Topsoil will be compacted sufficiently to ensure a firm seedbed for reseeding purposes. The final topsoil surface will be scarified as needed prior to revegetation.

6.2 Low Permeability Clay Cover Soils

Cover soils will be low permeability, high clay content soils, large rock material will be avoided. Clay rich soils located on-site will be used as cover material using the same criteria outlined in Section 6.1 for quality control.

Cover soils will be will be compacted with tracked or equivalent equipment. Compaction methods also may include rolling and/or vibrating, as necessary. Cover soils will be inspected and approved by United Park or its representatives prior to topsoil placement.

The final cover subgrade surface will be uniform to allow for the placement of a consistent topsoil layer.

6.3 Clearing, Grubbing and Site Preparation

If needed, excavation and construction areas will be cleared prior to excavation and/or the placement of materials. Clearing and grubbing will include the removal of organic matter such as plants, trees and woody material, as well as any other material from the Site. Large non-organic materials such as boulders that interfere with grading will be removed from the areas as required.

6.4 Grading

Surfaces and subgrades will be graded to approximate final configurations and shapes prior to cover and topsoil placement. Subgrades and final graded surfaces will be confirmed by conventional survey techniques. Dust control will be conducted during grading activities.

Final surfaces, grades and erosion control structures will not be considered complete until approved by United Park or its representative.

6.5 Revegetation

Revegetation will be conducted on all graded areas and areas receiving topsoil, the following sections describe materials and methods for restoration of the Site vegetative communities.

6.5.1 Seedbed

The seedbed will consist of topsoil placed during remedial activities. Topsoil will be lightly compacted and scarified as necessary. The seedbed will be roughened prior to seeding.

6.5.2 Seed Mix

The seed mix will include a mixture of deep-rooted annual and perennial native grass and forb species. The annual species will provide rapid germination to aid in short term revegetation. The short-term revegetation will decrease the runoff potential of the slope and will keep the imported soil in place. The perennial species will provide longer term, more stable revegetation. Appendix C contains the seed specifications for the Site.

6.5.3 Wetlands

The seed mixture for restoration and development of new wetlands, specific for the wetlands, can be found in Appendix C.

6.5.4 Planting

Seeding may be conducted by either broadcast and/or rangeland drill methods and will likely occur in the fall planting season. The upland and wetland seed mixtures, specific for the Site, can be found in Appendix C.

The seed application rate is to be about 25 lbs/acre, this rate will provide over 100 seeds per square foot of surface and the seed should be readily visible on the ground at this density. Personnel conducting the seeding will periodically check the seeding density to ensure that enough seed is being applied. In areas where equipment cannot safely conduct work reseeding will be done by hand.

United Park or its representative will monitor revegetation progress. If needed, additional seeds or fertilizer will be applied to assure the adequate establishment of vegetation.

Upland planting specifications:

- Organic mulch will be placed over seeded areas as needed.
- Commercial seed will be guaranteed to be from local seed sources.

- Soil testing will be conducted to the degree necessary to ensure successful revegetation of the Site. Amendments may be required to ensure revegetation success.
- The seedbed will be roughened or furrowed prior to seeding.
- "Hydro-seeding" may be used on an as-needed basis in limited areas where traditional seeding and mulching methods do not work. When "hydro-seeding" is used, it may be conducted as a two-step process: 1) drill or lightly rake the seed into the soil. Seed will be lightly covered or drilled ¼-inch deep before mulch is applied and 2) apply "hydro-mulch" (fiber-mulch) over the seed. Fibermulch will contain tackifier.
- A cover or nurse crop consisting of sterile wheat will be used where applicable.
- Where Curlex® (shredded aspen mulch) and/or coconut mulch is used, fertilizer will be applied.
- A slow release, complete, low-percentage fertilizer may be used at the rate of 100 lbs/acre. This can be applied with hydromulch or broadcast after drilling. Where fertilizer isn't used, the supplement Triple Super Phosphate at the rate of 25 lbs/acre may be used as an alternative.
- Where erosion blanket is used, blanket woven with jute fiber instead of monofilament line will be used.
- Erosion blanket and/or fiber mulch may be used on all slopes greater than 5° (9%).
- Upland seeding should be done in late fall (i.e. dormant seeding is preferred).

Wetland planting and planting specifications:

- Commercial seed will be guaranteed to be from local seed sources.
- Soil testing may be conducted to ensure successful revegetation. Soil amendments such as organic mulch or similar may be used to ensure successful revegetation. The seedbed will be roughened or furrowed seedbed prior to seeding.
- Organic mulch may be used over seeded areas.
- "Hydro-seeding" maybe used on an as-needed basis in limited areas where traditional seeding and mulching methods do not work. Where "hydro-seeding" is used, it may be conducted as a two-step process 1) drill or lightly rake the seed in by hand. Seed will be lightly covered or drilled ¼-inch deep before mulch is applied and 2) apply

"hydro-mulch" (fiber-mulch) over the seed. Fibermulch will contain tackifier. Avoid disturbing hydromulch once applied.

- Willows will be direct planted. Mature (but not decadent) willow clumps may be transplanted with an excavator or planted by hand depending upon willow species. Willows may need to be cared for in the interim between excavating and planting. This care will include keeping the rootmass moist and intact.
- Sedge *(Carex spp)* seed is photo-blastic and requires exposure to sunlight before germination can occur. This will be accomplished by one of two methods: 1) setting the seed out in sunlight for a day or two before sowing or 2) sowing seed directly on the soil surface without covering the seed. If the latter technique is used, this will mean that mulch must be delayed with untreated photo-blastic seed. Seeding *Carex* will be conducted on permanently moist but not wet soils to avoid seed rot.
- When commercial nurseries are used to grow tubing *Carex* stock, local seed sources will be used. The three common *Carex* species found on-site (i.e. water, beaked and Nebraska) may be planted either at water's edge (greenline) or in standing water.
- Cattails (*Typha latifolia*) will likely propagate on their own and therefore seeding is not required. To expedite the process, cattail rhizomes may be transplanted from nearby wetlands.
- Like cattails, reed canary-grass (*Phalaris arundinacea*) is propagated by seed; or rhizomes collected on-site. When seeded, seeds will be sown on moist, but not wet, soil.
- Baltic rush (*Juncus balticus)* seed needs will be sown in moist sites to ensure germination. Sod plugs from adjacent sites can be used in lieu of seeding. Like *Carex,* plugs of Baltic rush will establish more quickly than seed.
- Mid-spring to early summer is the most effective planting time for sowing seeds in wetlands or wherever the ground does not remain so wet as to rot seeds.
- Optimally, shrubs will be transplanted after November 1st, and before buds break in early spring.
- Planting tubing-stock of *Carex* and *Juncus* should be completed after the last hard freeze in spring (around June 15th). A two-day climatization period before planting is recommended.

- Planting depth for wetland seed is similar to upland seeding (¼-inch). If dead rhizomatous "sod" is present it will be discarded offsite.

6.6 Channel and Rip-Rap and Erosion Control Material

Where applicable, rock material will be used to protect the clay rich liner material in reconstructed channels and the South Diversion Ditch. Rip-rap material will be used for erosion control and velocity dissipation structures such as check dams. Channel and Rip-Rap materials will either come from clean on-site stockpiles or imported. Materials may be screened to sizes appropriate for Site uses and analyzed with the portable XRF to determine if any materials contain lead or arsenic concentrations greater than 500 ppm and 100 ppm, respectively.

Rip-rap and rock material will consist of well-graded material with sufficient size to dissipate stream energy and protect the underlying soils. Most ditches on the Site have relatively low gradients and thus will likely not have erosive velocities during periods of flow.

Rip-rap material and channel will be inspected by United Park or its representative prior to delivery and placement.

7.0 OPERATION AND MAINTENANCE PLAN

This section details Site Operation and Maintenance (O&M) after the completion of the remedial action.

7.1 Post Remedial Operation

Future land use at Richardson Flat beyond the Park and Ride/Recreation Facility is anticipated to be recreation in nature or certain other uses that may benefit the overall public and as approved in accordance with the Development Agreement between United

Park City Mines Company and Park City and in accordance with Summit County ordinances. On a portion of the Site, approximately 30 acres, recreational facilities such as soccer and baseball may be constructed.

7.2 Post Remedial Sampling and Monitoring

Post remedial sampling and monitoring may be completed in phases depending on closure of the repository and when certain work is completed. Surface water monitoring on the South Diversion Ditch will not be conducted until source removal and covering of contaminated sediments are completed.

A portion of the Site will be used as a repository for similar wastes removed from other United Park locations, and hence will not achieve final closure until completion of most remedial phases. Post remedial closure and monitoring samples will be collected from phases that are completed prior to complete Site closure. Areas such as the South Diversion Ditch and tailings south of the diversion ditch will likely be completed in advance of final Site closure. These areas will be sampled and monitored as completed phases prior to full Site closure.

Post remedial monitoring will be conducted in accordance with the specifications described in the Operations and Maintenance Plan (Appendix F). Post remedial sampling/monitoring will include the collection of surface water samples at the mouth of the South Diversion Ditch, up and downstream of the Site in Silver Creek for total and dissolved cadmium, lead and zinc. Vegetation and erosion monitoring will be conducted as part of the O & M plan. Sampling methodologies, Data Quality Objectives and Quality Assurance are presented in the FSP (Appendix B).

If in the unlikely event that water quality standards are exceeded (Site discharge has met applicable water quality standards for the past seven years), an additional sample will be collected to confirm the exceedance. If the exceedance is confirmed the source will be investigated with additional sampling. When the source is confirmed corrective action

will be consistent with procedures presented in this RD/RA and may include additional capping and/or source removal.

7.3 Institutional Controls

This section details short and long term institutional controls for the Site.

7.3.1 Short-Term ICs

Short-term institutional controls will include the following:

1. Site access will be controlled with fencing and ingress/egress gates.
2. Signs will inform visitors of certain hazards (e.g. presence of mine wastes on the impoundment and construction activities).
3. During implementation of the remedial action all Site visitors will be required to sign-in with the United Park Project Manager or his designated representative.
4. Annual monitoring, for a period of five years, of the soil cover and vegetation for indications of erosion.
5. Water quality monitoring for a period of 2 years (see Section 7.2).

7.3.2 Long-Term ICs

Long-term institutional controls will include the following:

1. Land use, after remediation, will be deed restricted to a recreational or other use in accordance with the Development Agreement mentioned above within the Study Area Boundary.
2. A restriction will be placed on withdrawal of shallow groundwater from the alluvial aquifer for domestic, industrial, or agricultural uses within the Study Area Boundary.

8.0 Contingency Plan

In the event of an accident or emergency countermeasures will be taken to protect the local affected population and environment. The Site is located adjacent to vacant lands and due to the low mobility of Site materials (tailings, sediment and soils) a substantial release that would affect a large population is not expected. Accident and emergency countermeasures should generally be limited to construction worker injury, air release to low population areas, material spills of material being transported to the Site from offsite locations. The potential of material spills during transportation is low due the amount being carried by individual trucks (10-15 cubic yards) and materials are only being transported on-site within the Study Area Boundary.

8.1 Spill Control and Countermeasures

In the event of a release, spill or offsite migration of contaminants appropriate measures will be taken to reduce the potential effects to the local population and environment. Additional monitoring may be conducted based on procedures outlined in the FSP. Appropriate regulatory agencies will be notified in the event of a release of contaminated material. If required, sampling, assessment of materials and any necessary removal will be conducted according to procedures outlined in the FSP.

PART II: REMEDIAL ACTION WORK PLAN (RA)

This part includes the required elements of the Remedial Action Work Plan as described in Section 5.1.1, "Guidance on EPA Oversight of Remedial Designs and Remedial actions performed by Potentially Responsible Parties" EPA 540/G-900/001. Elements presented in this Part include: Description of the Remedial Action Team and roles of each team member, selection of remedial contractor, Schedule, Implementation of Quality Assurance, Health and Safety, Contingency Plan Implementation, Data Collection and Project Closeout and Reporting Requirements.

9.0 PROJECT MANAGEMENT

Project management will be comprised of the management team used for the Remedial Design specified in Section 3.1. Confirmation sampling and construction oversight will be conducted by RMC. In addition a Site Safety Officer will be provided by RMC. Surveying and engineering oversight will be conducted by Alliance Engineering, Inc.

9.1 Remedial Contractor Selection

Geary Construction of Coalville, Utah has been selected as the primary earthwork contractor. In addition, United Park may complete portions of the remedial action using in-house personnel experienced with these types of activities which are currently being conducted on United Park properties (e.g. Empire Canyon).

10.0 SCHEDULE

Work is anticipated to follow a seasonal progression and will begin in the spring or late fall. Work at Richardson Flat may be preempted by work in the upper watershed where the construction season is much shorter. Remediation at Richardson Flat will begin again in the spring of each year. Work will continue through the fall until winter

precipitation interferes with efficient construction activities. The work has been outlined in various Tasks. These Tasks define a specific or stand-alone project that can be defined with a beginning and end. Each Task is numbered and shown on Figure 10-1. The numbering of the Tasks do not necessarily indicate the order in which they will be completed.

Work will begin in dry areas of the Site and will progress into low-lying wet areas as ground conditions allow. Upon the completion of upper watershed removal activities work at Richardson Flat will continue throughout the summer. Remedial work in the wetland west of the main embankment is anticipated to begin when remedial activities are completed at other sites upstream on Silver Creek.

Placement of mine wastes from other sites in the Silver Creek watershed will occur over a period of time and may cease when United Park has remediated all of its sites in the watershed.

11.0 CONSTRUCTION PROCEDURES

This section details construction procedures for the remedial action.

11.1 Health and Safety

All work conducted during the implementation of this action and during post construction monitoring will follow the United Park City Mines Company Health & Safety Policy found in Appendix E. United Park representatives will ensure that all Site workers understand and follow the health and safety policy. All personnel and contractors working with contaminated materials will have appropriate health and safety training including OSHA certification as required by 29 CFR 1910.120.

Air monitoring will be conducted in accordance with Sections 4.4.5 and 5.7.4 of the FSP (Appendix B).

11.1.1 Dust Control

Fugitive dust will be controlled to comply with ARARs for the Site. There are two categories of potential fugitive dust that may occur during the remedial action, 1) general fugitive dusts from construction activities and 2) fugitive dusts containing lead. Based on previous experience with construction work on other United Park projects, most fugitive dusts are generated during haulage. Typically, very little fugitive dust is generated during excavation and loading activities. United Park will implement Best Management Practices (BMP's) to control fugitive dusts. Fugitive dust BMP's will include the following:

1. The Project Coordinator (or designated representative) will be responsible for the observation of Site conditions and presence of fugitive dusts.
2. All trucks leaving and entering the contaminated areas within the Site will be covered or wetted down as required.
3. Water and chemical dust suppressants may be used at the discretion of the Project Coordinator to control fugitive dust generated on the roadways.
4. The Project Coordinator may halt work until Site conditions improve when dusts are apparent.

During excavation and earthmoving activities personnel air monitoring samplers will be placed on excavating equipment and at locations upwind and downwind of the excavation area. Sampler location will be based on daily earthmoving activities and wind direction. The predominant wind direction is northwest (RMC, 2004a). Equipment and personal filter analysis will be compared to OSHA and NIOSH standards for lead. Results of the upwind and downwind filter analyses will be compared to National Ambient Air Quality Standards (NAAQS) for lead. Filters from the samplers will be collected and analyzed with expedited turnaround time in order to conduct any required corrective action. If the standards are exceeded for the previous day, United Park will institute BMP's. If the

standards are exceeded for the quarterly reporting period, United Park will comply with the appropriate reporting requirements.

11.2 Site Preparation

Site preparation prior to the start of remedial activities will include activities such as worker training, Site fencing as needed, delineation of work and staging areas establishing ingress/egress, posting signs and limiting entry. Clearing and grubbing of initial work areas will be conducted prior to remedial activities, as necessary. Decontamination areas will be established prior to the start of remedial activities.

11.3 Excavation

This section details excavation procedures to be conducted in dry and wet areas of the Site.

11.3.1 Tailings South of the Diversion Ditch

Excavation of dry or damp unsaturated materials will be conducted whenever possible. Seasonally wet areas such as the area south of the county road will be excavated during typically dry conditions late summer and fall. Soils will be excavated using trackhoes, scrapers, bulldozers and other appropriate earthmoving equipment. If necessary, trucks will be covered or wetted down prior to hauling materials across the county road. Where required haul roads will be constructed with clean material. Where required appropriate traffic controls measures will be established. To insure that all contamination is removed from the excavated areas, potentially up to six-inches of underlying base material will be excavated in addition to tailings. Based on sampling results presented in the RI (RMC, 2004a) this quantity is sufficient to remove contamination. The light gray tailings and dark brown underlying soil interface is visually apparent, however screening with a field portable XRF will be conducted to assess metals concentrations in underlying soils. In addition five-percent of screening samples will be submitted to the analytical laboratory

and analyzed for lead and arsenic as per the procedures and methodologies described in the FSP (Appendix B).

Two culverts will be installed in the South Diversion Ditch and covered to provide access to the impoundment for earthmoving and transport equipment.

11.3.2 Constructed Wetlands

Final excavation and grading of constructed wetlands in the area will be monitored to confirm that grades are sufficient to convey and distribute water throughout each wetland area. Where necessary, grades will be monitored by conventional survey methods. Distribution channels, berms and swales will be configured during this final grading and confirmed after channel material placement. Inflow and outflow channels and flow control structures will be installed at the completion of grading when possible. If required to keep construction areas dry, these control structures may be placed prior to grading and will be used to prevent water from entering the construction area. Silt fencing will be used to prevent the discharge of soils to the South Diversion Ditch and Silver Creek during construction.

Constructed Wetland 1 will be constructed in native materials upon completion of tailings removal in this area. Soil removed during the grading of the Parking Lot Wetland will be used as cover and topsoil as required. As documented in the RI (RMC, 2004a) this wetland is located in an area that does not contain tailings. Topsoil will be placed as described in Section 11.4.

11.3.3 Wetland Area between the Main Embankment and Silver Creek

Remediation in this wetland will not occur until the South Diversion Ditch remediation is completed. Prior to excavation, the South Diversion Ditch will be diverted around or through the wetland either in a pipe or by excavating a new channel away from

contaminated sediments. The wetland will be allowed to dry for 3- 6 months prior to removal activities. To prevent migration of sediments, a temporary settling basin will be constructed on the downgradient side of the wetland. On the east side of the Rail Trail Bridge and along Silver Creek, silt fencing will be placed around the excavation area to prevent sediment from leaving the wetland during excavation activities. This work will occur after upstream Silver Creek contaminant sources have been remediated and will be conducted during the low flow season in the South Diversion Ditch and Silver Creek.

Excavation in the wetland area will be conducted "wet". Due to standing water and the soft nature of the highly saturated and organic soils of the wetland, a series of access ramps may be necessary to remove contaminated materials. The access areas will be excavated first and ramps will then be constructed out into the wetlands. The ramps will be constructed of clean fill material and will be of sufficient thickness to support excavation and hauling equipment. As excavation and fill placement is completed within the reach of each ramp, the equipment will retreat and spread the ramp material to grade as a source of clean fill. Ramp configuration will be dependent on the reach of the trackhoe used for excavation. Wetland construction features are presented in Figure 5-7. All sampling will be conducted according to the methodologies and procedures described in the FSP (Appendix B).

11.4 Soil Placement

Soil will be placed in dry areas. Areas such as the seasonally wet northern portion of the impoundment will not receive soils until the typically dry end of summer and fall portions of the construction season. Soil areas will be evaluated by visual inspection prior to soil placement. Clay rich cover soils will be placed to a thickness of twelve-inches. Cover soil will be compacted with tracked equipment. Six-inches of topsoil will be placed over the clay rich cover soil. Topsoil will be lightly compacted prior to seedbed preparation.

Prior to placement the soil will be field screened and sampled as per the procedures and methodologies described in the FSP (Appendix B).

11.4.1 Impoundment Material Placement

Mine waste and cover materials will be placed on the Impoundment in a staged manner to maximize capacity and to minimize pore pressure changes in the impoundment. Material will be compacted using tracked equipment. Material will be placed starting near the main embankment moving easterly toward the county road. Soil placement in this manner will effectively "squeeze" water in the direction of lowest pore pressure, i.e. the dryer tailings on the east end of the impoundment. The Impoundment has been divided into eight zones, F-1 through F-8 (Figure 5-1, Sheet 2) for material placement. Tailings and mine waste material placement will start in zone F-1, F7 and F8. When sufficient material is placed in zone F-1 placement will start in zone F-2 F7 is for the most part complete and F8 only requires enough fill or cover to bring the depth to 18". This process will continue for zones F-2 through F-6 until the Impoundment is closed. Silt fencing will be used as required to control the runoff of materials prior to cover placement. Any grading required to allow for surface drainage will be performed prior to cover soil placement. As each zone is closed, cover material will be added as described in Section 11.4.

A network of channels will be installed to drain surface water to the South Diversion Ditch and to a lesser extent the wet area in the northern portion of the impoundment (Figure 5-1, Sheet 2). The channels will be constructed upon final material placement for each zone. Channels will be constructed according to the details presented on Figure 5-3.

11.5 South Diversion Ditch

Sediments in the bottom of the Diversion Ditch will be removed to comply with the conditions of the Record of Decision. Clean soils or other media will be placed in the bottom of the channel as needed to promote the growth of wetland vegetation.

Silt fencing and other appropriate sediment retention structures will be placed at the terminus of the ditch during remediation of the ditch.

11.6 Revegetation

This section details the revegetation procedures for the Site.

11.6.1 Seedbed

The seedbed will consist of topsoil or other soil materials supplemented with organic materials placed during remedial activities. This material will be lightly compacted and scarified as necessary. A seedbed will be roughened prior to seeding.

11.6.2 Seed Mix

The seed mix will include a mixture of deep-rooted annual and perennial native grass and forb species. The annual species will provide rapid germination to aid in short term revegetation. The short-term revegetation will decrease the runoff potential of the slope and will keep the imported soil in place. The perennial species will provide longer term, more stable revegetation. The seed mixture, specific for the Site, can be found in Appendix C.

11.6.3 Planting

Reseeding will be conducted by either broadcast seeding or drill seeding methods and will likely occur in the fall. Seed is to be broadcast with an ATV or tractor mounted broadcast seeder and/or a rangeland drill seeder.

The application rate is to be about 25 lbs/acre. This rate will provide over 100 seeds per square foot of surface and the seed should be readily visible on the ground at this density.

Personnel spreading seed will check the seeding density to ensure that enough seed is being applied. United Park or its representative will monitor revegetation progress. If needed, additional seeds or fertilizer will be applied to assure the adequate establishment of vegetation.

11.6.4 Wetland Revegetation

Wetland plant species were previously characterized as part of the Remedial Investigation (RMC, 2004a). Figure 2-15 in the RI report portrays the types and extents of wetland plant species that are currently found in the wetland. To the extent possible, the wetland will be revegetated with the same or similar species. Prior to remediation, United Park may collect certain plant seeds and or root-stock from the wetland for transplanting when the wetland remediation is complete.

11.7 Storm Water Controls

United Park will modify the existing Utah Pollution Discharge Elimination System (UPDES) Stormwater Permit for Industrial Activity (UPDES Stormwater Permit #UTR100978) to meet the UPDES Stormwater Permit for Construction Activities requirements. Modification to the existing permit will include a description of the Remedial Action activities. The plan will be prepared prior to implementing the Remedial Action. The plan will address stormwater run-on and run-off associated with the remedial activities.

Best Management Practices (BMPs) will be followed during each phase of the remedial action. BMPs will include but not be limited to: silt fencing, temporary berms and sediment catchment basins.

11.8 Decontamination

All equipment will be thoroughly decontaminated before leaving the Site. Excavation and haulage equipment will be decontaminated prior to working in clean areas or transporting clean materials. Decontamination will consist of removing gross contamination with shovels and brooms and, if necessary, washing with water. All decontamination soils and water will be disposed of in the tailings impoundment. Decontamination areas will be set up in the tailings impoundment. The location and plan details of the decontamination area are presented on Figure 11-1.

11.9 Monitoring Well Abandonment

Monitoring wells located in removal areas will be abandoned prior to work being conducted in those areas. Two types of monitoring wells exist on-site: 1) shallow piezometers which generally consist of one-inch (1") PVC inserted into boreholes and 2) monitoring wells consisting of PVC well materials, bentonite and cement surface seals as well as steel outer casings.

Piezometers will be abandoned by backfilling the well bore with bentonite chips as the PVC is pulled from the ground. If the piezometer contains an end plug, the PVC will be pulled and the borehole will then be filled with bentonite chips. Monitoring wells will be abandoned by a driller licensed by the State of Utah. Monitoring wells will be backfilled with bentonite after the removal of well materials. Monitoring well abandonment will follow applicable State of Utah regulations.

11.10 Data Collection

Data collection will be conducted in accordance with procedures and methodologies described in the FSP (Appendix B) and described in Section 5.0. Data will include screening during construction/remediation and post remedial confirmation sampling.

12.0 DELIVERABLES

Reporting of on-site activities will conducted quarterly. Quarterly reporting will document all Site activities. Quarterly reporting will include a description of actions taken toward achieving compliance, a summary of all tests and data received, a summary of Site inspections, schedule for activities planned during the next quarter, a summary of applicable O&M activities, schedule modification and any other information pertinent to the Site.

Implementation of the Remedial Action will occur during the spring to fall construction season. Progress reports will be prepared and submitted to EPA on a quarterly basis.

A Construction Completion Report will be prepared and submitted to EPA 90 days after all remedial activities are completed on the Site (with the exception of O&M). The Construction Completion report will include a final Site Inspection report to verify that remedial activities are complete.

13.0 REFERENCES

Applied Geotechnical Engineering Consultants, Inc., 2001, Stability Evaluation, Richardson Flat Tailings Embankment, Near Park City, Utah.

Dames & Moore, 1974, Report of Embankment and Dike Design Requirements, Proposed Tailings Pond Development, Near Park City, Utah: Consultant's report prepared for Park City Ventures Corporation, March, 1974.

Montgomery Watson Harza Americas, Inc., (MWH), 2002, Hydrogeologic Review of Richardson Flat Tailings Site.

Resource Management Consultants, Inc (RMC), 2001, Sampling and Analysis Plan, Remedial Investigation, Richardson Flat, Site ID Number: UT980952840, With Attached Work Plan.

Note: The following 2 documents in combination are referred to as the "RIFS":

Resource Management Consultants, Inc (RMC), 2004a, Focused Remedial Investigation (RI) Report for Richardson Flat, Site ID Number: UT980952840.

Resource Management Consultants, Inc (RMC), 2004b, Focused Feasibility Study Report (FS) for Richardson Flat, Site ID Number: UT980952840

United States Department of Interior (DOI), Natural Resource Damage Assessments: Final Rule, Federal Register (43CFR 11), August 1, 1986.

United States Environmental Protection Agency (EPA), 2005, Record of Decision, Richardson Flat tailings Site.

United States Environmental Protection Agency (EPA), 1990, Guidance on EPA Oversight of Remedial Designs and Remedial actions performed by Potentially Responsible Parties, EPA 540/G-900/001.

Weston Engineering Inc., 1999, Preliminary Hydrogeologic Review of Richardson Flats Tailing Site, Prepared for LeBoeuf, Lamb, Greene & MacRae, LLP, March 23, 1999.

Table 1-1
Chemical Specific ARARs

Requirement	Citation	Description	Determination	Comment
Definitions and General Requirements of Utah Water Quality Act	UAC R317-1	Provides definitions and general requirements for waste discharges to waters of the State of Utah	Applicable	Substantive standards are applicable to point source discharges of contaminants into Silver Creek (if any), but permitting requirements would be preempted by operation of 42 USC 9621(e)(1).
Utah Surface Water Quality Standards	UAC R317-2-6 UAC R317-2-13 UAC R317-2-14	Establishes use designations for Silver Creek (as tributary to the Weber River): Class 1C - Protected for domestic purposes with prior treatment processes as required by Utah Div. of Drinking Water. Class 2B - Protected for secondary contact recreation such as boating, wading. Class 3A - Protected for cold water species of game fish and aquatic life. Class 4 - Protected for agricultural uses and stock watering	Applicable	Substantive standards are applicable to point source discharges of contaminants into Silver Creek (if any), but permitting requirements would be preempted by operation of 42 USC 9621(e)(1).
Groundwater Quality	UAC R317-6	Establishes state groundwater quality standards	Applicable	Substantive standards are applicable to discharges of contaminants to ground water discharges (if any), but permitting requirements would be preempted by 42 USC 9621(e)(1).
Solid and Hazardous Waste	40 CFR § 261.4(b)(7)	Criteria for the Identification and Listing of Hazardous Waste	Applicable	Mine tailings are not a hazardous waste.
Solid and Hazardous Waste	UAC R311-211-3	Corrective Action Cleanup Standards Policy -UST and CERCLA sites	Applicable	RPM will establish appropriate cleanup standards based on the factors set forth in R311-211-3.
Utah Storm Water Rules	UAC R317-8-3.9	Establishes state storm water requirements	Applicable	Requires implementation of best management practices to address storm water management at the Site.

Table 1-1 (continued)
Location Specific ARARs

Requirement	Citation	Description	Determination	Comment
Protection of Wetlands	33 USC § 1344	Prohibits discharge of dredged or fill materials into waters of the United States.	Relevant and Appropriate	Although 404 permit is not required, the remedy should seek to avoid, restore, or mitigate impacts to jurisdictional wetlands as appropriate.
Historic Sites, Building and Antiquities Act	16 USC §§ 461-467	Requires protection of landmarks listed on National Registry	Applicable	Proposed activities will not adversely affect any listed landmark
National Historic Preservation	16 USC § 470	Requires protection of district, site, building, structure or object eligible for inclusion in national register of historic places	Applicable	Proposed activities will not adversely affect any such district, site, building, structure or object
Archeological and Historic Preservation Act	16 USC § 469	Requires preservation of significant historical and archeological data	Applicable	Proposed activities will not adversely affect archeological data or landmarks
Fish and Wildlife Coordination Act	16 USC § 662	Requires that actions taken in areas that may affect streams and rivers be undertaken in a manner that protects fish and wildlife	Applicable	USFWS has been consulted with regard to actions impacting Silver Creek
Endangered Species Act	16 USC § 1531	Requires protection of endangered and threatened species	Applicable	USFWS has been consulted with regard to protection of endangered and threatened species.
Migratory Bird Treaty Act	16 USC § 703 *et seq*	Requires protection of migratory nongame birds	Applicable	USFWS has been consulted with regard to protection of migratory nongame birds.
RCRA Subtitle D Solid Waste Requirements	UAC R315-303-3(4)	Establishes closure requirements for permitted solid waste landfills.	Relevant/Appropriate	Relevant and appropriate to onsite repository under Alternatives 3 and 5, to the extent technically practicable.
Air Quality	UAC R307-205-6	Emission Standards	Applicable	Requires management practices to limit fugitive emissions from tailings piles.

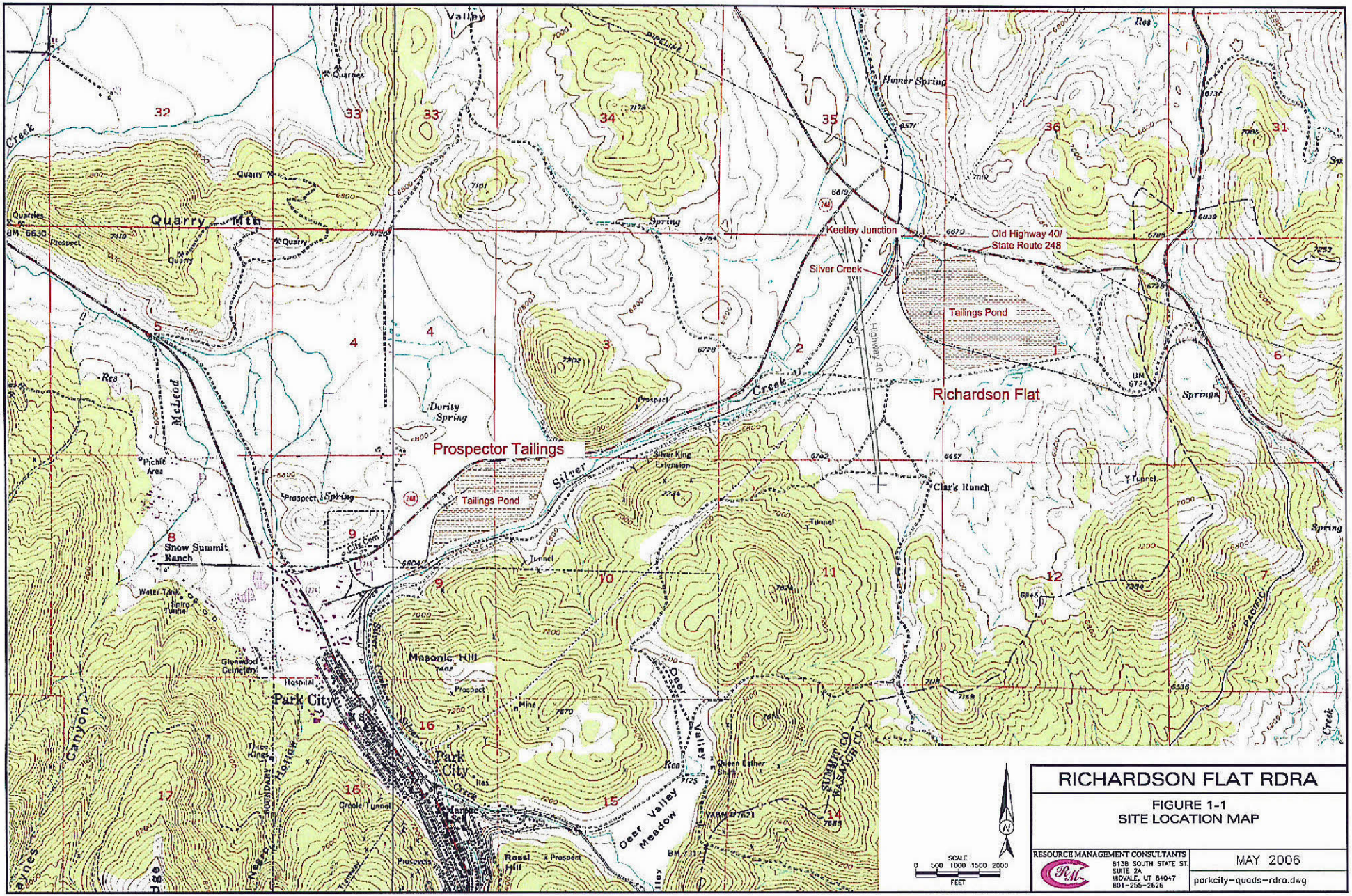
Table 1-1 (continued)
Action Specific ARARs

Requirement	Citation	Description	Determination	Comment
Abandoned wells	UAC R655-4	Standards for drilling and abandonment of wells.	Applicable	Applicable to the drilling or closing of wells that are abandoned or installed as part of the remedy.
Utah Storm Water Rules	UAC R317-8-3.9	Establishes state storm water requirements	Applicable	Requires implementation of best management practices to address storm water management at the Site.
Criteria for Classification of Solid Waste and Disposal Facilities and Practices	40 CFR Part 257.3	Establishes Criteria for use in determining which solid waste facilities and practices could adversely affect human health and the environment	Applicable	
Standards Applicable to Generators of Hazardous Waste	40 CFR Part 262	Establishes Standards for Generators of Hazardous Waste	Applicable	Applicable to any hazardous waste that is not Bevill-exempt.
General Facilities Standards	UAC R315-8-2	Location Standards	Applicable	Applicable to any hazardous waste that is not Bevill-exempt.
Closure and Post Closure	UAC R315-8-6	Closure Plan/Performance Standards	Applicable	Applicable to any hazardous waste that is not Bevill-exempt.

Table 1-1 (continued)
Action Specific ARARs

Requirement	Citation	Description	Determination	Comment
Waste Piles	UAC R315-8-12	Waste piles performance standards	Applicable	Applicable to any hazardous waste that is not Bevill-exempt.
Landfills	UAC R315-8-14	Performance standards for landfills	Applicable	Applicable to any hazardous waste that is not Bevill-exempt.
Risk Based Closure Standards	UAC R315-101	Establishes risk-based closure and corrective action standards	Applicable	Applicable to any hazardous waste that is not Bevill-exempt.
Corrective Action Cleanup Standards Policy	UAC R311-211	Lists general criteria in Establishing clean up standards	Applicable	RPM will establish appropriate cleanup standards based on the factors set forth in R311-211-3.
OSHA	29 USC § 651	Regulates workers health and safety	Applicable	
Utah Ground Water Quality Protection Rules	UAC R317-6	Contaminants that remain on site must not present a leaching threat to ground water	Applicable	Substantive standards are applicable to discharges of contaminants to ground water discharges (if any), but permitting requirements would be preempted by 42 USC 9621(e)(1)
Standards Applicable to Hazardous Waste Transporters	40 CFR Part 263	Regulates Transportation of Hazardous Waste	Applicable	Relevant and appropriate to any hazardous waste that is not Bevill-exempt.

Figures



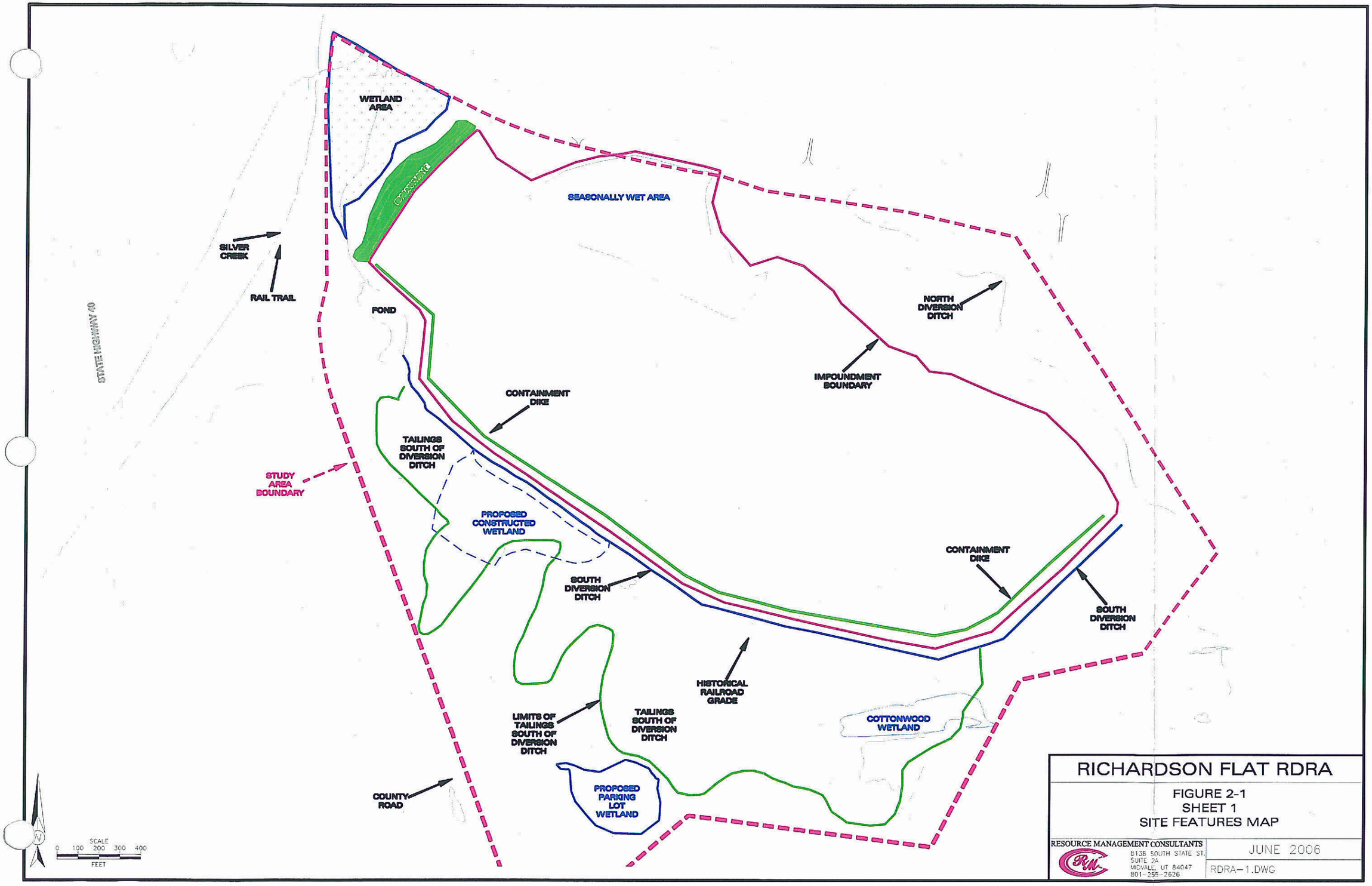
RICHARDSON FLAT RDRA

FIGURE 1-1
SITE LOCATION MAP

RESOURCE MANAGEMENT CONSULTANTS
8138 SOUTH STATE ST.
SUITE 2A
MIDVALE, UT 84047
801-255-2626

MAY 2006

parkcity-quads-rdra.dwg



RICHARDSON FLAT RDRA

FIGURE 2-1
SHEET 1
SITE FEATURES MAP

RESOURCE MANAGEMENT CONSULTANTS
813B SOUTH STATE ST.
SUITE 2A
MIDVALE, UT 84047
801-255-2626

JUNE 2006

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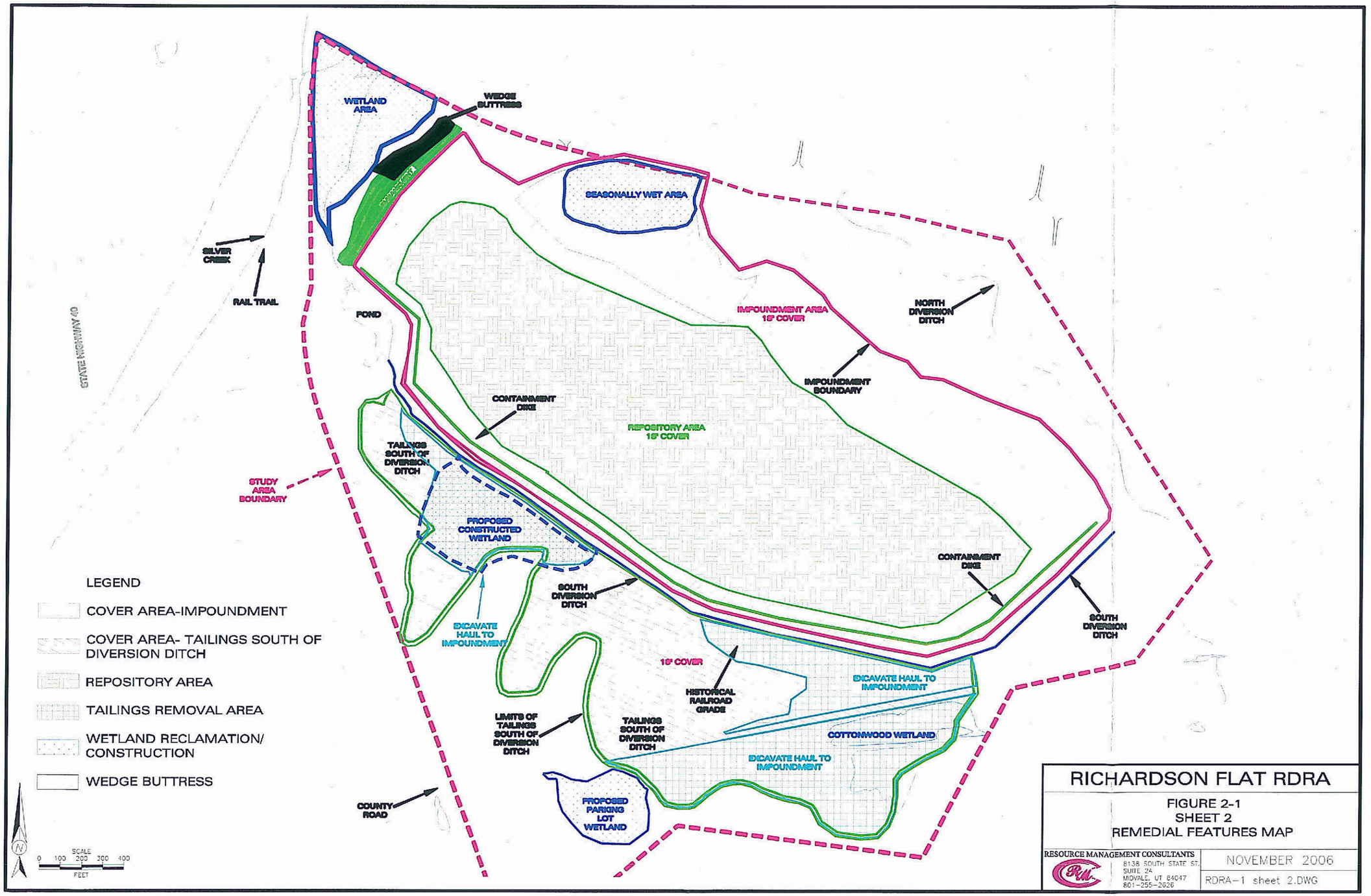

RICHARDSON FLAT RDRA

FIGURE 2-1
SHEET 2
REMEDIAL FEATURES MAP

RESOURCE MANAGEMENT CONSULTANTS
8138 SOUTH STATE ST.
SUITE 2A
MIDVALE, UT 84047
801-255-2626

NOVEMBER 2006

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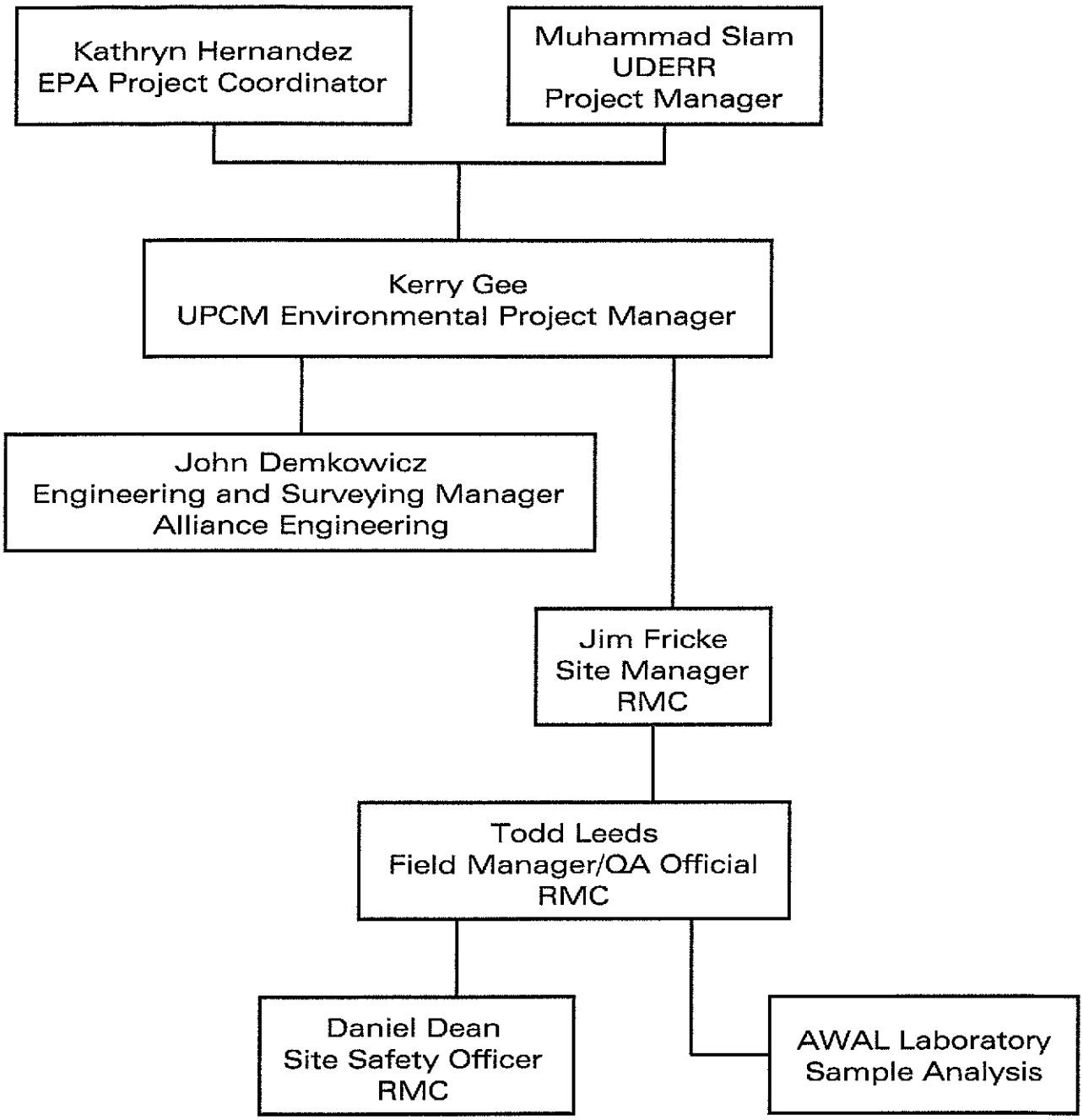
FIGURE 3-1 - Richardson Flat RD/RA Organizational Chart



rf-org-chart.dwg

WETLAND AREA (Figure 5-5)

WEDGE BUTTRESS

BUTTRESS

SEASONALLY WET AREA BRING COVER TO 12" AND PLACE 6" TOPSOIL

IMPOUNDMENT AREA BRING COVER TO 12" AND PLACE 6" TOPSOIL DRAIN TO SEASONALLY WET AREA

SILVER CREEK

RAIL TRAIL

STATE HIGHWAY 49

POND

CONTAINMENT DIKE

REPOSITORY AREA COVER TO 12" AND PLACE 6" TOPSOIL DRAIN TO SOUTH DIVERSION DITCH

IMPOUNDMENT BOUNDARY

NORTH DIVERSION DITCH

IMPOUNDMENT AREA BRING COVER TO 12" AND PLACE 6" TOPSOIL DRAIN TO SOUTH DIVERSION DITCH

TAILINGS SOUTH OF DIVERSION DITCH (Figure 5-4)

SOUTH DIVERSION DITCH

SOUTH DIVERSION DITCH

CONTAINMENT DIKE

HISTORICAL RAILROAD GRADE

COTTONWOOD WETLAND

TAILINGS SOUTH OF DIVERSION DITCH (Figure 5-4)

COUNTY ROAD

LIMITS OF TAILINGS SOUTH OF DIVERSION DITCH

NOTES:

1: MATERIAL STAGING IS PRESENTED ON SHEET 2.
2: DRAINAGE CONFIGURATION IS DETAILED ON SHEET 2.

N

SCALE
0 100 200 300 400
FEET

RICHARDSON FLAT RDRA

FIGURE 5-1 - SHEET 1
IMPOUNDMENT AREA DETAIL

RESOURCE MANAGEMENT CONSULTANTS
6138 SOUTH STATE ST.
SUITE 2A
MIDVALE, UT 84047
801-255-2626

MARCH 2006

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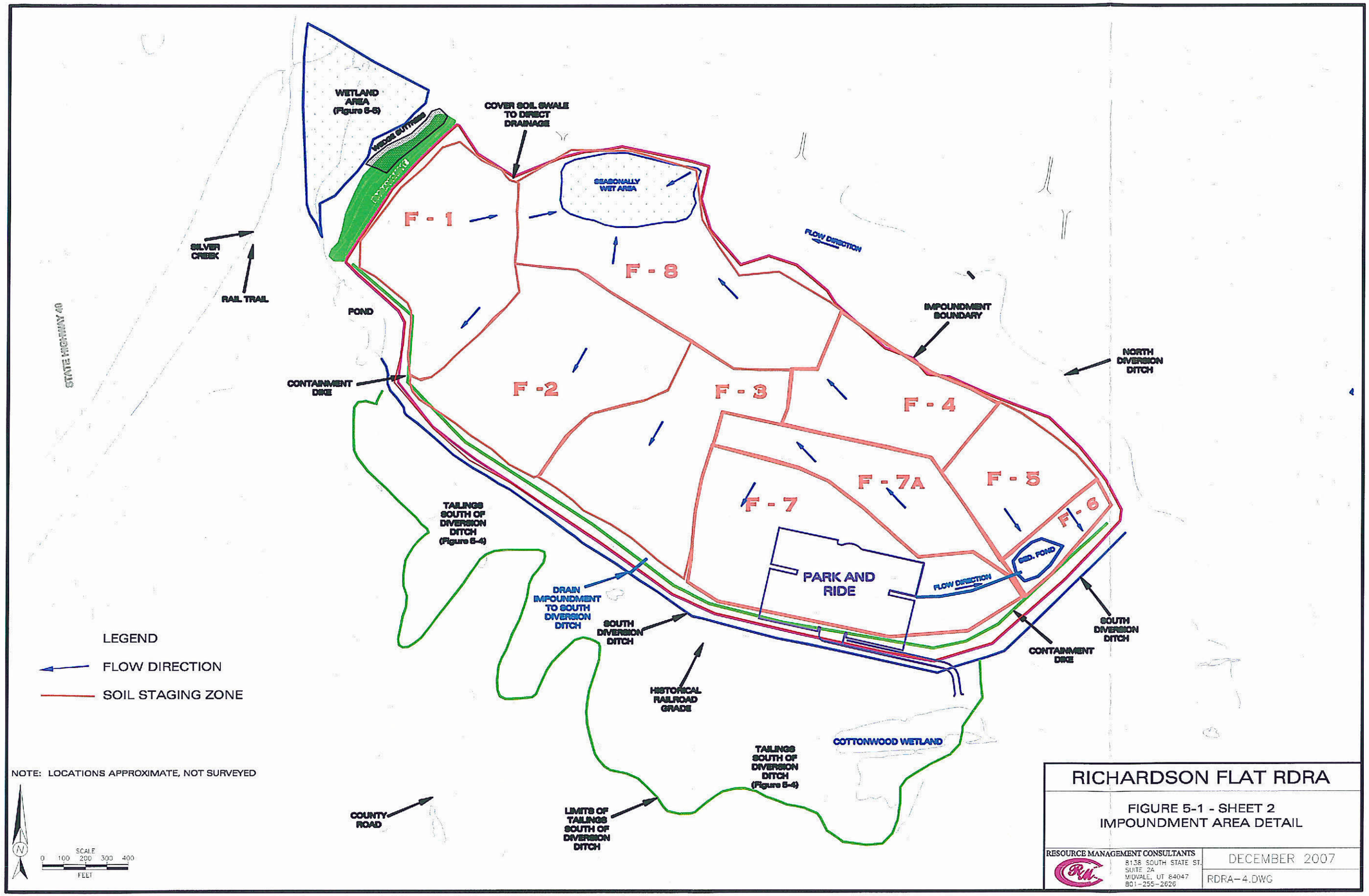

RICHARDSON FLAT RDRA

FIGURE 5-1 - SHEET 2
IMPOUNDMENT AREA DETAIL

RESOURCE MANAGEMENT CONSULTANTS
8138 SOUTH STATE ST.
SUITE 2A
MIDVALE, UT 84047
801-255-2626

DECEMBER 2007

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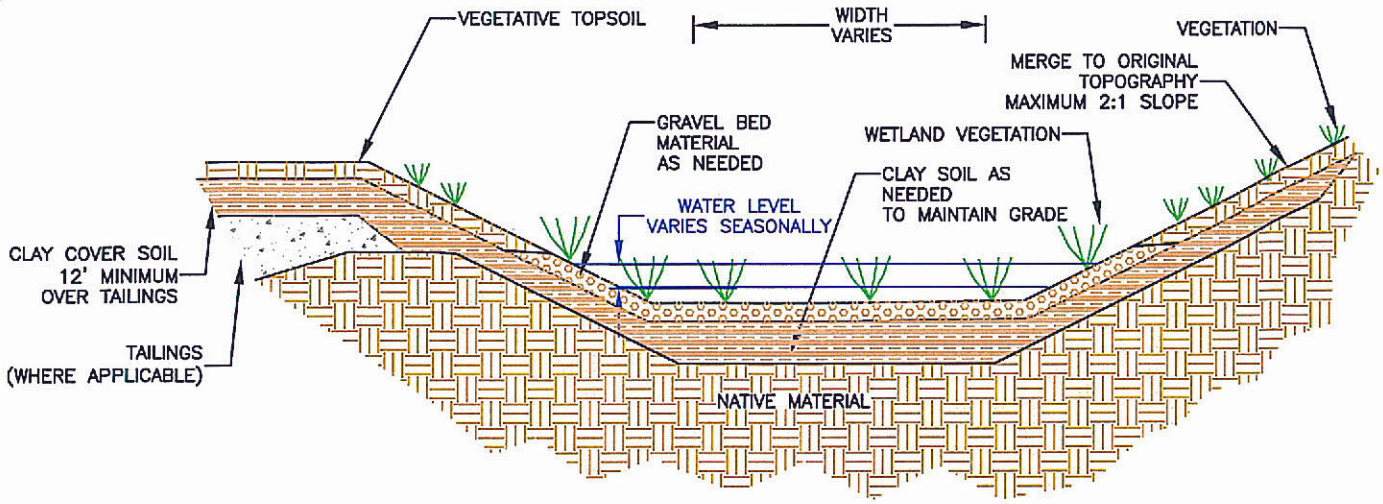
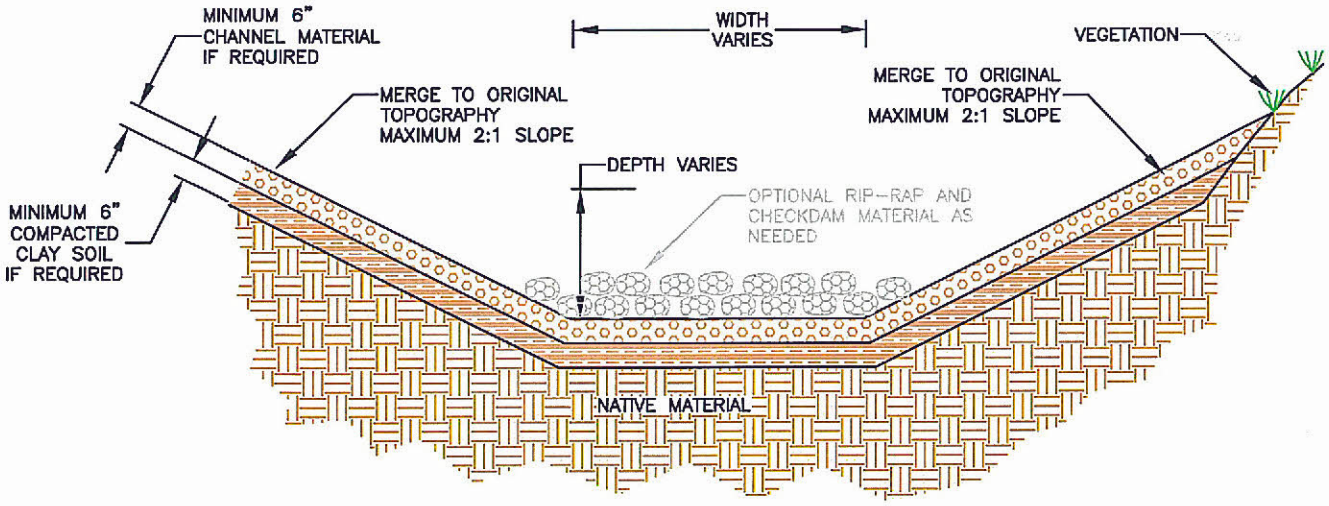


SOUTH DIVERSION DITCH TYPICAL DETAILS



CHANNEL CONSTRUCTION TYPICAL DETAILS

NOT TO SCALE

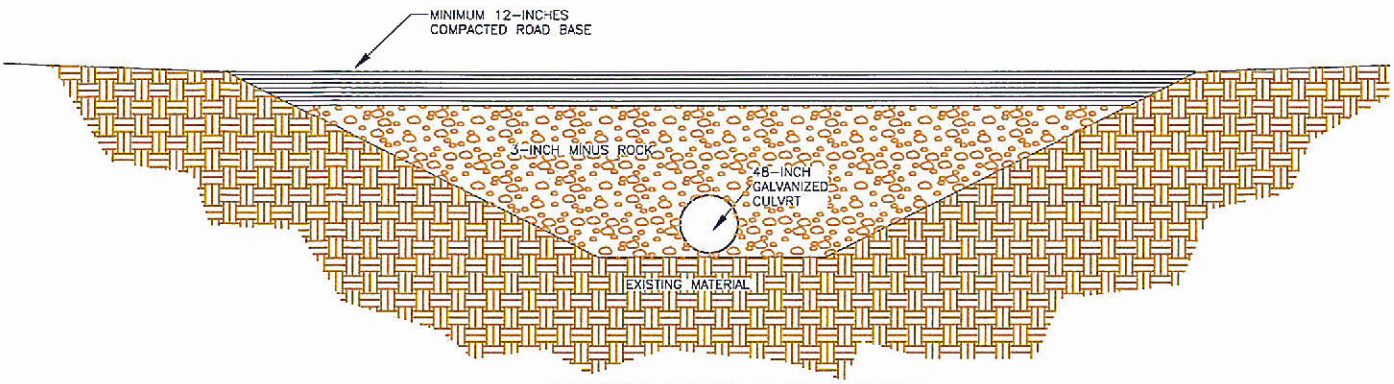
RICHARDSON FLAT RDRA

FIGURE 5-3
SOUTH DIVERSION DITCH
AND CHANNEL
DESIGN DETAILS

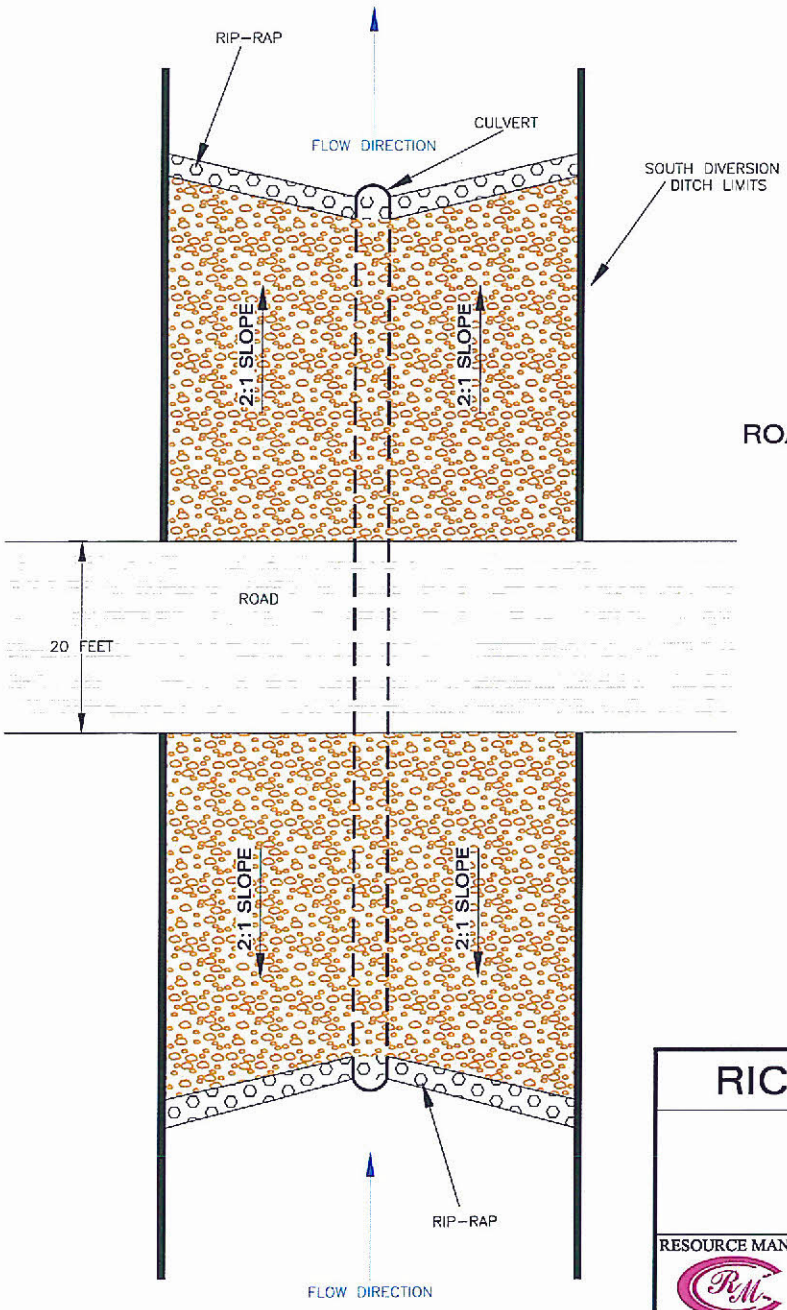
RESOURCE MANAGEMENT CONSULTANTS
8138 SOUTH STATE ST.
SUITE 2A
MIDVALE, UT 84047
801-255-2626

NOVEMBER 2006

rdra-typ-design.dwg



SOUTH DIVERSION DITCH
ROAD CROSSING TYPICAL DETAILS
CROSS SECTION VIEW



SOUTH DIVERSION DITCH
ROAD CROSSING TYPICAL DETAILS
PLAN VIEW

NOT TO SCALE

RICHARDSON FLAT RDRA

FIGURE 5-6
SOUTH DIVERSION DITCH
ROAD CROSSING
TYPICAL DETAILS

RESOURCE MANAGEMENT CONSULTANTS
8138 SOUTH STATE ST.
SUITE 2A
MIDVALE, UT 84047
801-255-2626

MAY 2006

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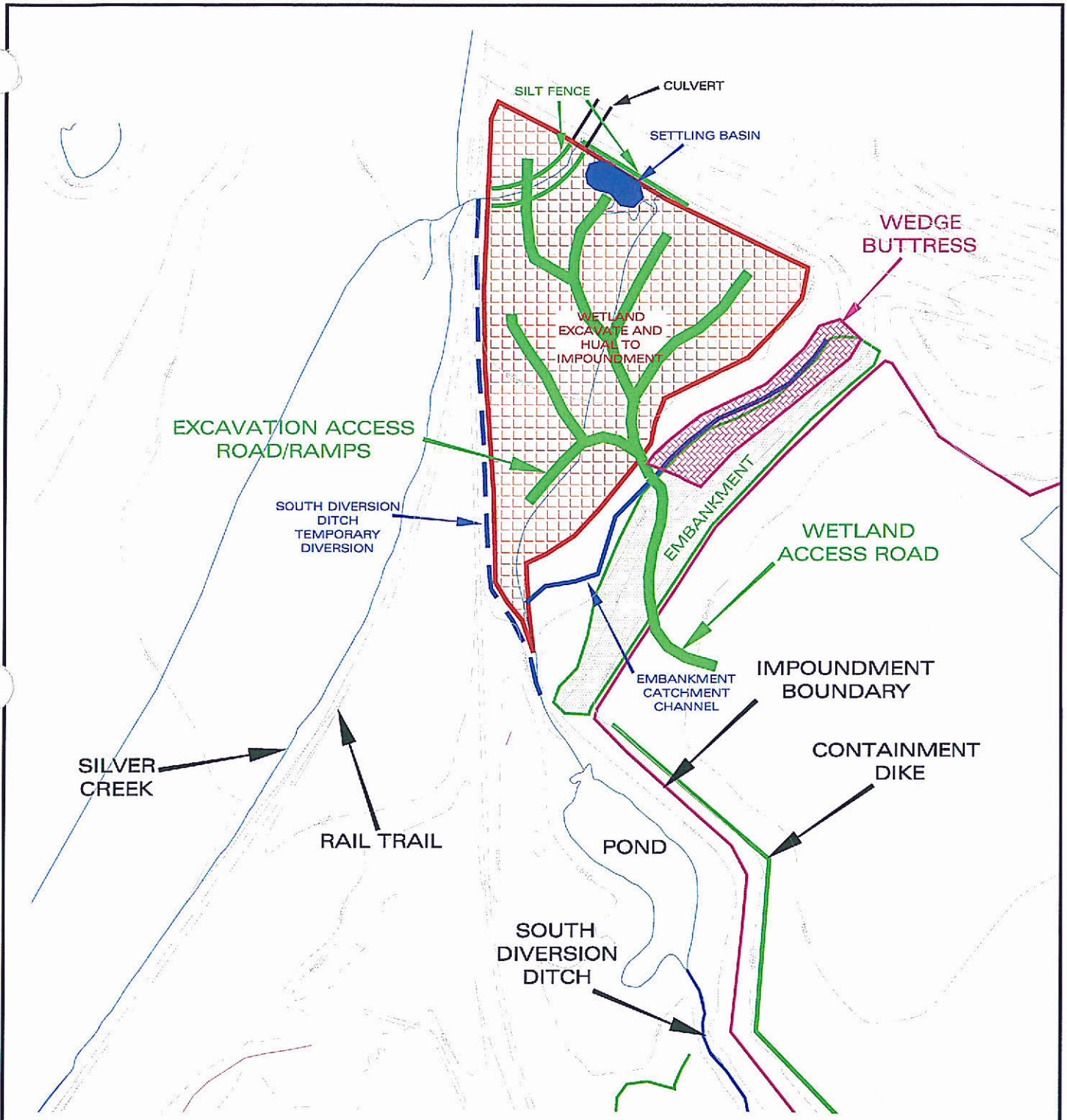

RICHARDSON FLAT RDRA

FIGURE 5-7
WETLAND AND EMBANKMENT AREA DESIGN DETAIL

RESOURCE MANAGEMENT CONSULTANTS
8138 SOUTH STATE ST.
SUITE 2A
MIDVALE, UT 84047
801-255-2626

MAY 2006

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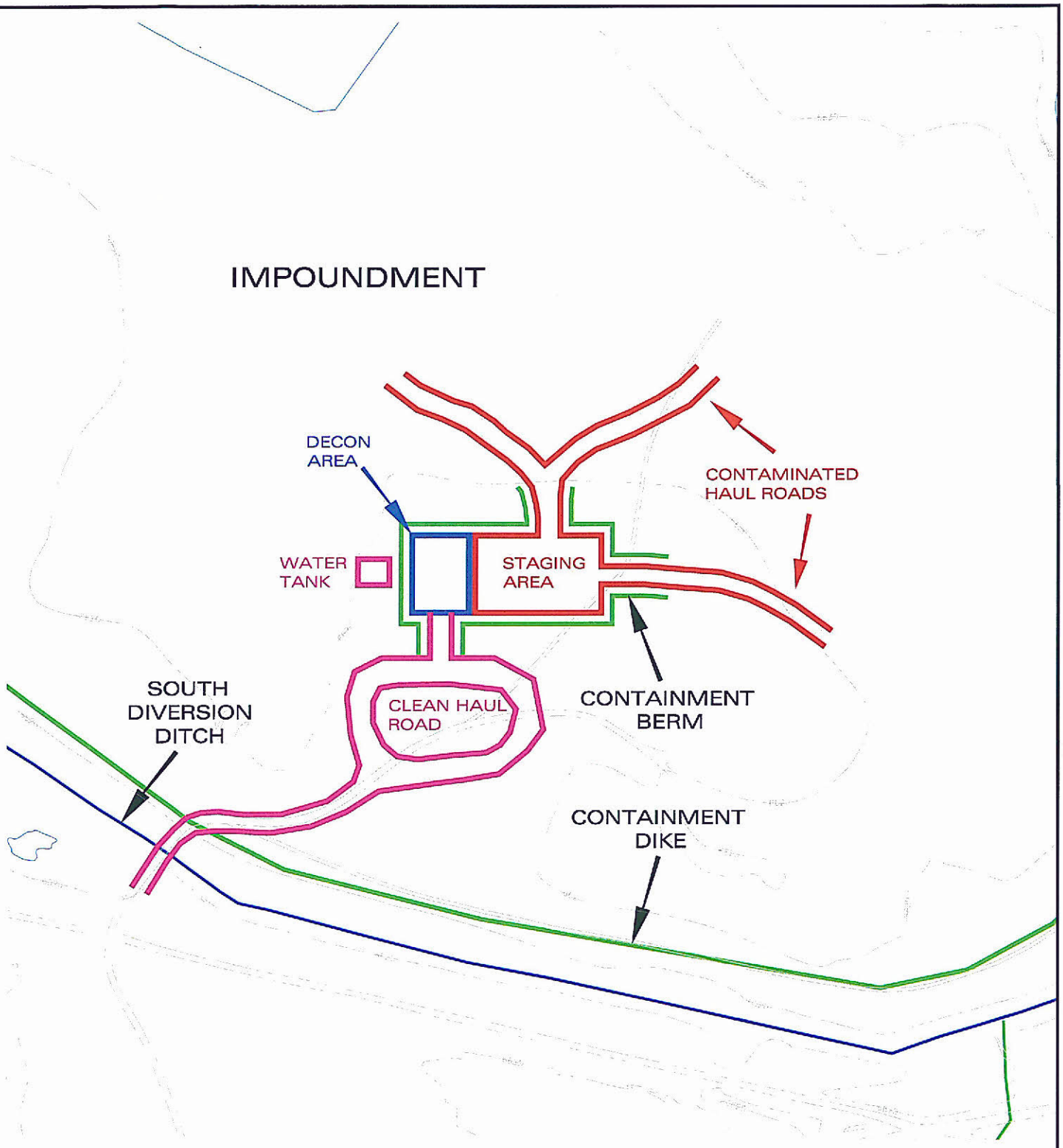

RICHARDSON FLAT RDRA

FIGURE 11-1
DECONTAMINATION AREA DETAIL

RESOURCE MANAGEMENT CONSULTANTS
8138 SOUTH STATE ST.
SUITE 2A
MIDVALE, UT 84047
801-255-2626

NOVEMBER 2005

RDRA-6.DWG

Appendix A

APPENDIX A

RD/RA Contact Information

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  jim@rmc-ut.com

APPENDIX B

FIELD SAMPLING PLAN
FOR
REMEDIAL DESIGN REMEDIAL ACTION
RICHARDSON FLAT TAILINGS SITE

SITE ID: UT980952840

Richardson Flat Tailings Site
Park City, Utah

PART I – FIELD SAMPLING PLAN
PART II – QUALITY ASSURANCE PROJECT PLAN

12/7/2007

Prepared by:

Resource Management Consultants
8138 South State Street, Suite 2A
Midvale, Utah 84047

Prepared for:

United Park City Mines Company
P.O. Box 1450
Park City, UT 84060

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1.0 INTRODUCTION

This document serves as the Sampling and Analysis Plan (SAP) for a Remedial Action and post-remedial Operations and Maintenance at the Richardson Flat tailings impoundment (Site). This work is being conducted as part of the Remedial Design/Remedial Action United Park City Mines Company (United Park) voluntarily agreed to conduct in the Consent Decree dated July 6, 2005.

This SAP has been prepared as guide for sampling described in and required by the Remedial Design/ Remedial Action Work Plan (RD/RA).

Sampling activities conducted as part of this SAP will occur during two phases: I) The Remedial Action and II) Post-remedial Operations and Maintenance (O&M). All sampling during both phases will be conducted following this SAP.

There have been numerous investigations conducted at the Site over the past seventeen years by the Environmental Protection Agency (EPA), Utah Department of Environmental Quality Division of Environmental Response & Remediation (DERR) and United Park. There has been significant remediation by United Park over the past ten years including capping the surface of the tailings with clay soils and reconstruction of the South Diversion Ditch. These studies and previous remedial projects are summarized in the Remedial Investigation/ Feasibility Study (RMC, 2004a&b).

Figure 1.0 shows the geographic location of the Site. Site features are presented on Figure 1.1.

The SAP is comprised of the Field Sampling Plan (FSP) and the Quality Assurance Project Plan (QAPP) and includes the following sections:

Section 1 -Introduction
Section 2 -Site Background

Part I: Field Sampling Plan

Section 3 - Sampling Program, Rationale, and Locations
Section 4 - Field Activity Methods and Procedures

Part II: Quality Assurance Project Plan

Section 5 - Project Management
Section 6 - Quality Control Requirements
Section 7 - Assessment and Oversight
Section 8 - Data Validation and Usability
Section 9 - Measurement and Data Acquisition
Section 10 - References

Appendix A - Standard Operating Procedures
Appendix B - AWAL QA/QC Documentation

1.1 Objectives

This SAP describes the collection and analyses of surface water, sediment and soil samples as well as several field data collection measurements to be performed in the field concurrently with remedial activities and post-remedial O&M. The sampling effort will be conducted in two phases and will provide data to determine if the Remedial Action is complete:

Phase I – Remedial Action

- Confirm that contamination has been removed from removal areas located within the tailings south of the diversion ditch (TSDD) area.
- Confirm that sediments remaining in the wetland do not exceed the Site PRG of 310 ppm lead.
- Confirm that imported soils meet applicable regulatory standards and are of sufficient thickness to satisfy the specifications described in the RD/RA.
- Confirm that soil cover placed as part of the Remedial Action meets the specifications described in the RD/RA.
- Confirm that the gravel cover placed in the South Diversion Ditch meets the specifications described in the RD/RA.
- Confirm that Site air quality meets worker safety standards for lead (NIOSH/OSHA) and offsite emissions meet National Ambient Air Quality Standards (NAAQS) for lead.

Phase II – Post-Remedial Operation and Maintenance

- Confirm that surface water emanating from the South Diversion Ditch (SDD) meets applicable regulatory standards.
- Vegetation and erosion monitoring. Monitoring will be conducted to ensure that the cap over the mine wastes remains intact and vegetation is suitable to protect cap soils.

Section 3.1 further explains how these data will be used.

1.2 Project Schedule and Deliverables

Phase I data collection will occur during implementation of the Remedial Action. Timing of the data collection is dependent on the timing of remediation. Remediation will start in 2007. As remediation proceeds, sampling will consist of confirmation sampling in removal areas and Quality Assurance sampling of construction materials.

Phase II data collection will be dependent on the completion of remediation. Upon completion of remediation, sampling will consist of periodic surface water, erosion and vegetation monitoring.

The following deliverables will be provided by RMC:

- Quarterly progress reports;
- Data quality assessment;
- Memorandum documenting the occurrence and resolution of data quality issues, should they occur; and
- Laboratory sample results and QC data

2.0 SITE BACKGROUND

A detailed description of the Site, including a description of the Site operational history, existing closure measures and elements, regional geology, surface and groundwater are set forth in the Remedial Investigation (RI, RMC, 2004a). The study area, Site history, previous Site investigations, and environmental setting are summarized below.

2.1 Study Area

United Park is the current owner of a large parcel of property (Property), comprising approximately 700 acres, located in Summit County, Utah (Figure 1-1). The Site includes a historic mine tailings impoundment consisting of a 160-acre, geometrically closed basin formed by an earth embankment and a series of perimeter containment dikes. The tailings impoundment resulted from decades of mining and milling silver-laden ore in the area around Park City known as the Park City Mining District. The tailings impoundment is now covered by clean soils. A wetland area on the Site occupies approximately eight acres, with a pond just south of the wetland that is approximately one acre in surface area. Water flowing from the pond on the embankment on the south side of the tailings impoundment flows in a northwesterly direction in a discrete channel where it mixes with a portion of the Silver Creek flow in the northwestern corner of the wetland area (Figure 1-1).

Silver Creek forms the western boundary of the Site. Several man-made and natural barriers affect the flow pattern of Silver Creek near the Site. Near the northwestern corner of the wetland area, Silver Creek flows into the wetland beneath the rail trail bridge and flows through the wetland in a channel to the northeast where it mixes with flow from the SDD, and exits the area in a concrete box culvert under State Highway 248.

Remedial areas are presented in Figure 2-0.

2.2 Site History

Site history is presented in the RI (RMC, 2004a).

2.3 Previous Site Investigations

Previous Site investigations are presented in the RI (RMC, 2004a)

2.4 Environmental Setting

The Study Area is roughly 6,570 feet above mean sea level. The study area is located in the Basin and Range physiographic province, approximately 40 miles northwest of Salt Lake City, Utah.

The Study Area is characterized by a cool, dry, semi-arid climate. Long-term meteorological observations have not been kept at the Site. The two nearest meteorological data stations are located in Park City, Utah which is located 500 feet higher in elevation three miles to the southeast in the Wasatch Mountains, and Kamas, Utah located at a similar elevation to the Site and nine miles to the east. Precipitation and temperature at the Site likely falls between the values for Park City and Kamas. Annual precipitation at Park City is 21.44 inches of water with an annual average high temperature of 56.3 degrees and an annual average low temperature of 30.8 degrees. Annual precipitation at Kamas is 17.27 inches of water per year with an average annual low temperature of 29.0 degrees and an average annual high temperature of 58.7 degrees (www.wrc.dri.edu, 2001).

More comprehensive descriptions of the environmental settings and lists of references are available in the RI (RMC, 2004a).

PART I: FIELD SAMPLING PLAN

3.0 SAMPLING PROGRAM, RATIONALE, AND LOCATIONS

The Field Sampling Plan (FSP) for this investigation has been developed to provide guidance for sampling during Site remediation and for post-remedial O&M.

3.1 Experimental Design and Sampling Rationale

The general objective of this sampling effort is to determine if remediation is conducted in accordance with the RD/RA.

Phase I sampling is being conducted to verify that the Remedial Action is being conducted in accordance with the Remedial Design.

Phase II sampling is being conducted to determine if the Remedial Action has been effective and is complete.

3.2 Sample Media and Parameters

All sampling described below is required to achieve the project objectives. The focus of sample collection activities proposed in this SAP is evaluation of the following environmental Site media. Table 3.0 summarizes the sample media and parameters to be measured.

3.3 Sampling Locations

Figure 3.0 shows sample locations at the Site. Additional opportunity samples may collected on an as-needed basis during remediation and post remedial O&M. These additional opportunity samples will be determined by field personnel as conditions warrant for the following uses, including but not limited to: guiding excavation, soil assessment, confirming soil cover depth and confirming removal completion for specific areas. Opportunity sample locations will be determined in the field on an as-needed basis.

Surface Water – Surface water samples will be collected at locations RF-6-2, RF-7-2 and RF-8 (Figure 3.0) as part of Phase II post-remedial monitoring on a quarterly basis. RF-6-2 is located at the terminus of the SDD.

XRF - Field screening will be conducted concurrently with removal and soil importation on an as-needed basis. XRF screening will be conducted at a minimum of twenty-one source removal grid locations (Figure 3.0). Additional XRF locations include but are not limited to: source removal areas, wetland area, imported soil locations and soil cover areas. Five-percent of samples will be analyzed by the laboratory.

Cover - Thickness measurements will be conducted at 148 locations on a 200' by 200' grid. Additional opportunity measurements will be collected on an as-needed basis.

Wetland - Samples will be collected at twenty-four locations on a 100' by 100' foot grid. Additional opportunity samples will be collected on an as-needed basis to guide the excavation of sediments.

Source Removal Areas - samples will be screened with the XRF at twenty-one locations on a 200' by 200' grid. Infill XRF screening will be conducted at additional locations on an as-needed basis. Five-percent of samples will be analyzed by the laboratory.

Imported Soils - Sampling locations will be determined by the location of imported soils. Soils will be screened as needed with the XRF. In addition one composite laboratory sample will be collected for every 5,000 cubic yards. The actual numbers of samples will be determined based on material volumes.

Particulate Sampling - Particulate air monitoring sample locations will be dependent on wind direction and daily work areas. A minimum of three samples will be collected concurrently per sampling event at the following locations: upwind, downwind and adjacent to operating equipment/personnel locations.

Erosion and Vegetation Monitoring – Monitoring will occur Site-wide. Sample locations will be determined during the O&M phase of the Remedial Action. Vegetation monitoring locations will consist of plots located in fixed locations and other locations to be determined in the field. Vegetation monitoring locations will be established for both wetland and upland areas.

4.0 FIELD METHODS AND PROCEDURES

The following field methods and procedures will be used during this project (see Section 5.7 for laboratory analytical methods):

- Site Mobilization
- Mobilization of Equipment, Supplies, and Containers
- Equipment Decontamination
- Field Sample Collection
  - — Soil Sampling (Phase I)
  - — Sediment Sampling (Phase I)
  - — Cover Soil Thickness (Phase I)
  - — Particulate Air Samples (Phase I)
  - — Vegetation Cover Monitoring (Phase II)

— Surface Water Sampling (Phase II)

— Erosion Monitoring (Phase II)

Referenced SOPs are included in Appendix A.

4.1 Site Mobilization

RMC will identify and provide all necessary personnel, equipment and materials for mobilization and demobilization to and from the Site to collect samples. Equipment mobilization includes ordering and purchasing equipment and supplies. A complete inventory of available equipment and supplies will be conducted prior to the start of sampling.

4.2 Equipment, Supplies and Containers

Equipment and supplies necessary for field sampling are summarized in Table 4.0. This table separates field items into the following categories: sampling, health and safety, equipment and personal decontamination, and general field operations.

Sample containers and any required preservatives will be supplied by the laboratories or purchased from approved vendors. All sample containers will be pre-cleaned and traceable to the facility that performed the cleaning. Sample containers will not be cleaned in the field. Surface water containers will be triple rinsed in the field with sample media prior to filling.

4.3 Equipment Decontamination

All non-dedicated and non-disposable sampling equipment will be decontaminated prior to use at each station and between media types. Equipment decontamination procedures outlined in the SOP, *Standard Procedures for Sampling Equipment Decontamination* (RMC SOP 6, provided in Appendix A) will be used in this sampling program. Equipment will be decontaminated by placing the sampling equipment in a bucket filled with deionized (DI) water and non-phosphate soap, and removing any visible residual material from the sampling equipment with a brush. Any residual soap or debris will be removed by pouring DI water over the equipment. Sampling equipment will then be double rinsed with deionized water. Upon completion of this procedure, all equipment will be air dried and stored in a "clean" vessel or wrapped with foil until ready for use. Disposable "one-use" sampling equipment will be used whenever possible.

4.4 Field Sampling and Data Collection

Table 4.1 provides a summary of the analyses that will be conducted during Phase I and Phase II of the field investigation. The sample volumes, containers, and preservation requirements for these samples are specified in the QAPPP (Part II). Samples for chemical analysis will be identified as follows:

- Surface water samples will be designated with SW identifier;

- Sediment with a SD;
- Imported cover soil will be designated with a CV; and
- Soil will be designated with a SL.

The methods that will be used to collect the samples are discussed below.

4.4.1 Field X-Ray Fluorescence Screening

Field X-Ray Fluorescence (XRF) screening will be conducted to assess metals concentrations in "real time." XRF screening and data collection will be used during remedial activities for three purposes:

- The XRF will be used for confirmation sampling at grid locations in source removal areas (Figure 3.0). Five-percent of XRF confirmation soil samples will be analyzed by the laboratory for Quality Control/Quality Assurance.

- The XRF will be used for imported soil screening. Five-percent of XRF imported soil samples will be analyzed by the laboratory for Quality Control/Quality Assurance.

- In situ "ground shots" will be used to determine lead concentrations at specific locations concurrently with soil excavation and placement. Multiple ground shots will be taken at each location. Locations will be determined in the field concurrently with soil removal and placement activities. Due to the large amounts of XRF "shots" taken during this procedure (100's per day) it is impractical to collect Quality Control/Quality Assurance samples on a five-percent frequency. Random Quality Control/Quality Assurance will be collected on an as-needed basis

Samples may be air or oven dried if required. XRF screening will be conducted according to *Standard Procedures for XRF Field Screening* (RMC SOP 8) which is based on EPA Method 6200 and is presented in Appendix A.

4.4.2 Soil Sampling

Soil sampling will be conducted to determine concentrations of metals in imported cover soils and soils remaining in place after source removal (e.g. TSDD area). Discrete and/or composite samples will be collected. Composite samples will consist of five (5) subsamples per area/volume to be sampled. Soil sampling includes confirmation sampling in removal areas. Samples will also be screened with the XRF according to procedures described in Section 4.4.1.

The samples will be collected according to the SOP, *Standard Procedures for Collection of Surface Soil Samples* (RMC SOP 2a), presented in Appendix A.

The samples will be placed in glass or polyethylene containers and kept in coolers on ice (4 degrees Celsius) until transferred to a refrigerator at the laboratory.

The samples will be placed in glass or polyethylene containers and kept in coolers on ice (4 degrees Celsius) until transferred to a refrigerator at the laboratory.

4.4.3 Surface Water Grab Samples

Surface water samples will be collected at locations as shown on Figure 3.0. Samples will be collected on a periodic basis as part of post-remedial monitoring.
The samples will be collected according to the SOP, *Standard Procedures for Collection of Surface Water Samples* (RMC SOP 1), presented in Appendix A. Field analytical parameters and procedures are shown on Table 4.1 of this SAP. Surface water samples for dissolved metals analyses will be filtered in the field prior to sample preservation (RMC SOP 1, Appendix A).

The samples will be placed in glass or polyethylene containers and kept in coolers on ice (4 degrees Celsius) until transferred to a refrigerator at the laboratory.

4.4.4 Sediment Sampling

Sediment samples will be collected during Phase I as part of wetland remediation. Sediment samples will be collected as grab samples. Sample locations will based on a 100' by 100' grid (Figure 3.0). Additional samples may be collected to determine if Site PRGs have been met. The 0-6 inch depth horizons will be collected and will be transferred into a stainless-steel bowl or one-gallon plastic bag. The sample(s) from a given station will be mixed with large stainless-steel spoons or a gloved hand to achieve a uniform texture and color. The homogenized sample will be subsampled and transferred to the appropriate sample containers (Table 4.1). Large artifacts such as rocks and twigs will be removed from the sample during homogenization. The relative amount and types of material removed will be noted in the field logbook. In addition, sediment samples may be dried on-site and screened with the XRF to guide excavation.

The samples will be placed in glass or polyethylene containers and kept in coolers on ice (4 degrees Celsius) until transferred to a refrigerator at the laboratory. All samples will be analyzed as bulk samples.

The samples will be collected according to the SOP, *Standard Procedures for Collection of Surface Soil Samples* (RMC SOP 2a), presented in appendix A.

4.4.5 Particulate Sampling

Fugitive dust samples will be collected on particulate filters connected to portable air pumps. Pre-loaded filter cassettes will be supplied by the analytical laboratory. The particulate samples will be submitted for lead analysis. The sample results will be used to determine the average concentration of lead in ambient air. Particulate concentrations will be in weight per unit volume (e.g. micrograms per cubic meter, ug/m^3)

The flow rate of each pump will be measured and recorded prior to and after sample collection.

Samples will be collected upwind, downwind and adjacent to operating equipment or personnel. Upwind and downwind locations will be determined prior to sampling and will be based on current weather conditions and daily work. Periodic field blanks will be submitted to the laboratory. The field blank will consist of an unopened blank filter transported to the field but not exposed.

The samples will be collected according to the SOP, *Standard Procedures for Collection of Particulate Samples* (RMC SOP 7), presented in appendix A.

4.4.6 Soil Cover Depth

Soil Cover Depth will be measured during Phase I construction. During soil placement the thickness of each lift will be measured. If necessary, a hand coring tool will be used to measure thickness with minimal disruption to the cover.

4.4.7 Erosion Monitoring

Post remedial erosion monitoring will be conducted during Phase II to determine if soil cover is performing as intended. Erosion monitoring will consist of periodic Site inspections. Erosion monitoring will consist of inspecting the Site for visual evidence of areas affected by erosion. Areas of erosion will be documented for additional monitoring and/or corrective action.

Monitoring will be conducted according to the SOP, *Standard Procedures for Vegetation and Erosion Monitoring* (RMC SOP 9), presented in appendix A.

4.4.8 Vegetation Monitoring

Post remedial vegetation monitoring will be conducted during Phase II to monitor the success of revegetation in upland and wetland areas. Vegetation monitoring will consist of periodic Site inspections and include both permanent and non-permanent transects located in both upland and wetland areas to measure plant cover. Monitoring will include measurements of plant cover and density. Areas requiring further monitoring and/or revegetation will be documented for additional monitoring and/or corrective action.

Monitoring will be conducted according to the SOP, *Standard Procedures for Vegetation and Erosion Monitoring* (RMC SOP 9), presented in appendix A.

4.5 Investigation-Derived Waste

Investigation-derived waste (IDW) generated during this study will be handled in accordance with OERR Directive 9345.3-02 *Management of Investigation-Derived Wastes During Site Inspections* (EPA, 1991). Collecting only the volume of material needed to satisfy laboratory analytical requirements will minimize the generation of IDW. Any excess material will be discarded at the sample collection point.

PART II: QUALITY ASSURANCE PROJECT PLAN

5.0 PROJECT MANAGEMENT

The QAPP for the Richardson Flat RD/RA has been developed in accordance with EPA QA/R-5 guidance for preparing QAPPs (EPA, 1997). This section covers the basic area of project management, including the project organization, background and purpose, project description, quality objectives and criteria, special training, and documentation and records.

5.1 Project Organization

Organization and responsibilities specific to this investigation are discussed in this section. Laboratory services will be provided by an EPA-approved laboratory, which will analyze the soil, sediment, surface water and particulate samples for metals.

For this data collection effort, key management personnel are as follows:

Individual	Role/Responsibility
Kerry Gee	United Park Project Manager
Jim Fricke	RMC Site Manager
Kathryn Hernandez	EPA Remedial Project Manager
Mohammad Slam	DERR Project Manager
John Demkowicz P.E.	Engineering Project Manager
Todd Leeds P.G.	RMC QA Official/Field Manager
Daniel Dean	RMC Site Safety Officer

The management team consists of United Park personnel with assistance from RMC and other firms as needed. Figure 5.0 shows the chain-of-command for the project managers, engineers, and quality assurance officials responsible for managing the Richardson Flat Tailings Site RD/RA SAP.

United Park's environmental Project Manager for the Site is Kerry Gee, who will be responsible for all project management and communication with the regulatory agencies. Jim Fricke of RMC, Salt Lake City, Utah, leads United Park's environmental project consultant team and will be the Site Manager, who will be responsible for implementation of the SAP. Todd Leeds P.G., of RMC, is the Field Manager and QA Official who will be responsible for all field activities related to this document. Daniel Dean, RMC, is the Site Safety Officer, who will be responsible for visitor sign-in and ensure that all Site visitors comply with the HASP.

The EPA Project Coordinator is Kathryn Hernandez, Region VIII, Denver, Colorado. The Utah Department of Environmental Quality Division of Environmental Response and Remediation (DERR) Project Manager is Muhammad Slam. The EPA Project Coordinator and the DERR Project Manager work cooperatively to oversee the work being performed at the Richardson Flat

Site.

Mr. Gee, as Project Manager, is responsible for the overall management and coordination of the following:

- Coordination with EPA/DERR regarding the status of the project;
- Providing oversight of the subcontractors;
- Reviewing monthly status reports;
- Supervising production and review of deliverables;
- Tracking work progress against planned budgets and schedules;
- Informing EPA/DERR of changes in the RD/RA, SAP, HASP and/or other project documents;
- Notifying EPA/DERR immediately of significant problems affecting the quality of data or the ability to meet project objectives;
- Procuring subcontractors to provide sampling and analytical support;
- Providing oversight of report preparation;
- Organizing and conducting a field planning meeting.

Mr. Fricke, as the Site Manager, is responsible for the following:

- Preparing monthly status reports;
- Coordinating with the laboratory regarding the analytical, data validation, and Quality Assurance/Quality Control (QA/QC) issues related to sample analysis;
- Reviewing analytical results and deliverables from subcontractors;
- Incorporating changes in the RD/RA, SAP, HASP, and/or other project documents;
- Scheduling personnel and material resources;
- Implementing field aspects of the remediation, including this SAP and other project documents;
- Implementing the QC measures specified in the QAPP in this and other project documents;
- Implementing corrective actions resulting from staff observations, QA/QC surveillance, and/or QA audits;
- Providing oversight of data management;
- Coordinating and overseeing the efforts of the subcontractors providing sampling and analytical support;
- Scheduling and conducting field work;
- Notifying the subcontract analytical laboratory of scheduled sample shipments and coordinating work activities;
- Gathering sampling equipment and field logbooks, and confirming required sample containers and preservatives;
- Maintaining proper chain-of-custody forms and shipping of samples to the analytical laboratory during sampling events;
- Ensuring that sampling is conducted in accordance with procedures detailed in this SAP and

that the quantity and location of all samples meet the requirements of the SAP; and
- Identifying problems at the field team level; resolving difficulties in consultation with the QA/QC staff; implementing and documenting corrective action procedures at the field team level; and providing communication between the field team and United Park management.

The roles and responsibilities of other field team members will be to assist the Site Manager with sampling activities, sample handling, and overall documentation. Oversight activities, including sampling to be conducted by EPA's on-site contractor, will be coordinated between the EPA Project Coordinator and United Park's Project Manager. EPA's on-site contractor and the Site or Field manager will work together to coordinate sampling efforts.

5.2 Quality Assurance/Quality Control Organization

The Quality Assurance Official (QAO) is Todd Leeds P.G., RMC, who is responsible for the Quality Assurance/Quality Control of the data that are generated during implementation of the SAP. Mr. Leeds will report any QA/QC problems to the Site Manager. As the QAO, he will be responsible for the following:

- Reviewing and approving project specific plans;
- Directing the overall project QA/QC program;
- Maintaining QA/QC oversight of the project;
- Reviewing QA/QC sections in project reports, as applicable;
- Reviewing QA/QC procedures applicable to this SAP;
- Auditing selected activities of this project performed by RMC and subcontractors, as necessary;
- Initiating, reviewing, and following up on response actions to address QA/QC problems, as necessary;
- Consulting with the Site Manager and/or Project Manager, as needed, on appropriate QA/QC measures and corrective actions;
- Arranging performance audits of measurement activities, as necessary; and
- Providing written reports on QA/QC activity to the Project Manager and Site Manager.

5.3 Background and Purpose

Site background information for the Richardson Flat Site is provided in Section 2.0 of this SAP. The purpose and objectives of the work assignment are discussed in Section 1.1 of this SAP. The purpose of this QAPP is to provide guidance to ensure that all environmentally related data collection procedures and measurements are scientifically sound and of known, acceptable, and documented quality conducted in accordance with the requirements of the project.

5.4 Project Description

The QAPP addresses field work, data collection and laboratory analyses performed for this work assignment. Detailed project descriptions are outlined in the FSP sections above.

5.5 Data Quality Objectives (DQOs) and Criteria for Measurement

This section provides internal means for control and review so that environmentally-related measurements and data collected in this study are of known quality. The subsections below describe the DQOs (Section 5.5.1) and data measurement objectives (Section 5.5.2).

5.5.1. Data Quality Objectives

The DQO process is a series of planning steps based on the scientific method that are designed to ensure that the type, quantity, and quality of environmental data used in decision-making are appropriate for the intended purpose. The EPA has issued guidelines to help data users develop site-specific DQOs (EPA, 1994b). The DQO process is intended to:

- Clarify the study objective;
- Define the most appropriate type of data to collect;
- Determine the most appropriate conditions from which to collect the data; and
- Specify acceptable levels of decision errors that will be used as the basis for establishing the quantity and quality of data needed to support the design.

The goal of the DQO process is to help assure that data of sufficient quality are obtained to support remedial response decisions, reduce overall costs of data sampling and analysis activities, and accelerate project planning and implementation. Data Quality Objectives are summarized in Table 5.0.

The DQO process specifies project decisions, the data quality required to support those decisions, specific data types needed, data collection requirements, and analytical techniques necessary to generate the specified data quality. The process also ensures that the resources required to generate the data are justified. The DQO process consists of seven steps, of which the output from each step influences the choices that will be made later in the process. These steps include:

Step 1: State the problem;
Step 2: Identify the decision;
Step 3: Identify the inputs to the decision;
Step 4: Define the study boundaries;
Step 5: Develop a decision rule;
Step 6: Specify tolerable limits on decision errors; and
Step 7: Optimize the design.

During the first six steps of the process, the planning team develops decision performance criteria (DQOs) that will be used to develop the data collection design. The final step of the

process involves developing the data collection design based on the DQOs. A brief discussion of these steps and their application to this project is provided below.

Step 1: State the Problem

The purpose of this step is to describe the problem to be studied so that the focus of the study will be unambiguous. The sampling specified in this SAP will be conducted to provide Site-specific data to confirm the completion of remediation.

Step 2: Identify the Decision

This step identifies what questions the study will attempt to resolve and what actions may result.

Step 3: Identify the Inputs to the Decision

The purpose of this step is to identify the information that needs to be obtained and the measurements that need to be taken to resolve the decision statement. Based on the study questions, the following information is required:

- The final cover thickness in areas of remaining tailings;
- The concentrations of metals in remaining wetland sediments;
- The metals concentrations of water emanating from the SDD;
- The quality of revegetation and Site reclamation.

Step 4: Define the Boundaries of the Project

This step defines the spatial boundaries of the project. The entire project will be performed within the remedial areas as shown on Figures 2.0 and 3.0.

Step 5: Develop a Decision Rule

The Phase I decision process consists of the following steps:

1) Decide if the data collected is sufficient to determine if remediation is complete;
2) Compare sample results with regulatory guidelines and design specifications.

The Phase II decision process consists of the following steps:

1) Determine if additional work is required.

2) Determine if remediation is complete.

Step 7: Optimize the Design for Obtaining Data

This step identifies a resource-effective data collection design for generating data that are expected to satisfy the DQOs. The data collection design (sampling program) is described in detail in the FSP, Part 1 of this SAP.

5.5.2. Data Measurement Objectives

Based on the information provided on the DQOs, all analytical samples will be analyzed using EPA methods and other standard analytical techniques. Every reasonable attempt will be made to obtain a complete set of usable analytical data. If a measurement cannot be obtained or is unusable for any reason, the effect of the missing data will be evaluated by the QAO and Site Manager. Table 4.1 summarizes the analytical methods and data measurement objectives for analyses that will be conducted in the field investigations.

5.6 Quality Assurance Guidance

The field QA program has been designed in accordance with EPA's *Guidance for the Data Quality Objectives Process* (EPA, 1994b), and the EPA's *Requirements for Quality Assurance Project Plans for Environmental Data Operations* (EPA, 1997).

5.6.1. Precision, Accuracy, Representativeness, Completeness, and Comparability Criteria

Precision, Accuracy, Representativeness, Completeness, and Comparability (PARCC) parameters are indicators of data quality. PARCC goals are established for the Site characterization to aid in assessing data quality, as discussed in the following paragraphs:

Precision. The precision of a measurement is an expression of mutual agreement among individual measurements of the same property taken under prescribed similar conditions. Precision is quantitative and most often expressed in terms of relative percent difference (RPD). Precision of reported results is a function of inherent field-related variability plus laboratory analytical variability. Various measures of precision exist, depending upon "prescribed similar conditions." Field duplicate samples (1 duplicate / 20 samples) will be collected to provide a measure of the contribution to overall variability of field-related sources. Contribution of laboratory-related sources to overall variability is measured through various laboratory QC samples. The acceptable RPD limits for field duplicates are less than 35% for soil, water and sediments. Chemical analytical data will be validated for precision using field duplicates, laboratory duplicates, matrix spike/matrix spike duplicates (MS/MSDs), and laboratory control sample/laboratory control sample duplicates (LCS/LCSDs), as applicable.

Accuracy. Accuracy is the degree of agreement of a measurement with an accepted reference or true value, and is a measure of the bias in a system. Accuracy is quantitative and usually expressed as the percent recovery (%R) of a sample result. Ideally, it is

desirable that the reported concentration equals the actual concentration present in the sample. Acceptable QC limits for %R are 75% to 125% for LCS/LCSDs, method-defined for surrogates, and laboratory-defined for MS/MSDs. Chemical analytical data will be validated for accuracy using surrogates, MS/MSDs, and LCS/LCSDs, as applicable.

Representativeness. Representativeness expresses the degree to which sample data accurately and precisely represent (a) a characteristic of a population, (b) parameter variations at a sampling point, and/or (c) an environmental condition. Representativeness is a qualitative parameter that is most concerned with the proper design of the sampling plan and the absence of cross-contamination. Good representativeness will be achieved through: (a) careful, informed selection of sampling sites, (b) selection of testing parameters and methods that adequately define and characterize the extent of possible contamination and meet the required parameter reporting limits, (c) proper gathering and handling of samples to avoid interference and prevent contamination and loss, and (d) collection of a sufficient number of samples to allow characterization. Representativeness is a consideration that will be employed during all sample location and collection efforts and will be assessed qualitatively by reviewing field procedures and reviewing actual sampling locations versus planned locations.

Completeness. Completeness is a measure of the amount of usable data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. Evaluating the PARCC parameters will assess usability. Those data that are validated and need no qualification, or are qualified as estimated data, are considered usable. Rejected data are not considered usable. Completeness will be calculated following data evaluation. For this work, a completeness goal of 90% is projected for each analytical test. If this goal is not met, additional sampling may be necessary to adequately achieve project objectives.

Comparability. Consistency in the acquisition, handling, and analysis of samples is necessary for comparing results. Where appropriate, the results of analyses obtained will be compared with the results obtained in previous studies. Standard EPA analytical methods and QC will be used to ensure comparability of results with other analyses performed in a similar manner. Comparability is a qualitative parameter and cannot be assessed using QC samples.

5.6.2 Field Measurements

Field measurements specified in Table 4.1 will be conducted during the investigation. All procedures recommended by the manufacturer will be followed in calibrating and operating the instruments. Analytical methods, reporting limits, holding times, and QC analyses are discussed below.

5.7 Laboratory Analytical Methods

Analytical methods with corresponding laboratory reporting limits (LRLs) are specified on Table 4.1. Laboratories with established protocols and quality assurance procedures that meet or exceed applicable EPA guidelines will analyze samples by following these methods. Samples will be analyzed using EPA-approved or recommended methods when available and will include all associated QA/QC procedures recommended in each method.

Samples will be submitted to American West Analytical Laboratories (AWAL) in Salt Lake City, Utah. AWAL is certified with the State of Utah. Appendix B contains AWAL's QA/QC manual, and certification letters from the Utah Department of Health and Division Bureau of Laboratory Improvement. If another lab performs analyses, it must submit all QA documentation to the EPA for approval as described above and meet the following criteria:

- Demonstrated ability to achieve the required detection limits,
- Certified by the State of Utah, and
- Established internal QA/QC program.

If contradictions between the laboratory QA/QC manuals or other documents are identified, information in this SAP supersedes all other documents.

For sediment samples, the laboratory shall assume that the entire sample submitted for analysis is representative material. To avoid substance losses, any overlying water in sediment samples received from the field will be mixed into the sample before removal of a subsample for analysis.

5.7.1 Sediment

Sediment samples will be analyzed for lead (Table 4.1).

5.7.2 Surface Water

Samples of surface water will be analyzed for cadmium, lead, zinc (total and dissolved) hardness and the field analytical parameters noted in Table 4.1. Surface water samples will be analyzed for dissolved metals by filtering water samples through a 0.45 μm membrane filter in the field.

5.7.3 Soil

Soil will be analyzed for lead and arsenic as specified in Table 4.1.

5.7.4 Air

Air quality will be measured for lead contained in fugitive dust as specified in Table 4.1.

6.0 QUALITY CONTROL REQUIREMENTS

Quality control will include collecting field duplicates at a rate of five-percent of the sample load for each sample type, and ensuring that the laboratory runs matrix spike/matrix spike duplicates at a rate of five-percent of the sample load for each sample type. The field duplicates will be submitted "blind" to the sample laboratory, i.e., they will be given a separate sample identification number from the environmental sample, unidentifiable to the laboratory, as described above. Field duplicates will be run for the same analytical suite as the environmental samples.

Samples for preparation of matrix spikes and laboratory duplicates will be selected at random by the laboratory. Separate samples do not need to be collected in the field. The laboratory will perform and report all analyses under QA/QC procedures that include the results of method blanks, laboratory control samples, matrix spikes, and laboratory duplicates. Additional method-specific quality control procedures such as interference check samples, serial dilution, and internal standards will be used as specified for each analytical method in SW-846 (U.S. EPA 2003).

Due to the nature of the contaminants at this Site, ambient, equipment and trip blanks will not be collected.

6.1 Instrument/Equipment Testing, Inspection, and Maintenance Requirements

All instruments and equipment will be regularly tested, inspected, and maintained according to manufacturers' instructions. Field equipment will be tested and inspected daily before use. Any equipment found to be not functioning properly will be repaired or replaced. Laboratory equipment will be tested, inspected and maintained in accordance with the laboratory QA/QC manual and manufacturers' recommendations.

6.2 Instrument Calibration & Frequency

6.2.1 Field Instruments

RMC will follow the manufacturer's specifications to calibrate any field equipment prior to each day. These manufacturers specifications are included in RMC's SOP's (Appendix A).

6.2.2 Laboratory Equipment

Procedures and schedules for the calibration of laboratory equipment are described in the appropriate SW-846 and EPA methods, and in the laboratory's Quality Assurance Plan. These procedures and schedules will be followed for all laboratory work.

6.3 Data Management

Data from AWAL Laboratory will be submitted to United Park and RMC in both hard copy and electronic form. To avoid transcription errors, report tables will be prepared directly from the

electronic submittals.

7.0 ASSESSMENT / OVERSIGHT

7.1 Assessments and Response Actions

This section describes the number, frequency, and type of assessment activities needed for this project. Assessments coordinated by the Project QA Officer will include: (1) a readiness review prior to initiating each major phase of field work; (2) surveillance during representative phases of the project; (3) a technical systems audit (TSA) conducted toward the end of the first week of field work; and (4) a data quality assessment (DQA).

The readiness review will be conducted with both the field staff and analytical laboratories as a technical check to determine if the staff, subcontractors, equipment, and record keeping system are in place to start work in accordance with this QAPP. At the review, the QA Officer will review the project objectives, methodologies, record keeping requirements, and schedule with the field team and laboratories to make sure they are familiar and prepared to meet project requirements. The QA Officer will make sure all systems are ready before field work is initiated.

Surveillance will include weekly reviews of project progress and compliance with QAPP requirements. The project QA Officer will visit the field teams at the Site and observe their work habits and review project records. Based on the surveillance results, the QA Officer may propose corrective actions or changes to the field methods to the Project Manager.

A TSA will be conducted about halfway through the field portion of the project. Conducted to determine conformance to the QAPP, the TSA is a thorough and systematic on-site qualitative audit of all facilities, equipment, personnel, training, procedures and record keeping.

The DQA will be conducted to determine whether the data meet the assumptions that the DQOs and data collection design were developed under and whether the total error in the data are tolerable. This assessment activity will include complete data verification and validation as described in Section 5.0. *Guidance for the Data Quality Assessment Process* (EPA QA/G-9) will be consulted.

The QA Officer will report results of the assessment activities directly to the Project Manager who, with the assistance of the QA Officer, will be responsible for implementing any necessary corrective actions. The occurrence and resolution of major quality issues identified during assessment activities will be documented in memorandum to United Park, the EPA Project Manager Kathryn Hernandez and the UDEQ Project Manager Muhammad Slam.

8.0 DATA VALIDATION AND USABILITY

8.1 Data Review, Validation & Verification Requirements

The data validation process evaluates whether the specific requirements for an intended use have been fulfilled and ensures that the results conform to the users needs. The data validation process develops the QC acceptance criteria or performance criteria.

Data verification confirms that the requirements of the specified sampling and analytical methods were followed. This process involves reviewing the results of sampling and analysis to determine conformance with the QC requirements described for the project. The data verification process ensures the accuracy of data by using validated methods and protocols, and is often based on comparison with reference standards.

Requirements and methods for data validation and verification are listed in Tables 8.0 and 8.1.

8.2 Validation & Verification Methods

Data will be reviewed to ensure that the requirements stated in Table 4.1 and 8.0 were met. Data validation and verification will be conducted using the methods described in Table 8.1. Superfund's working definitions for data verification and validation are as follows:

> Data Verification: A consistent, systematic process that determines whether the data have been collected in accordance to the specification as listed in the approved QAPP. The process is independent of data validation and is conducted at various levels both internal and external to the data generator (laboratory).
>
> Data Validation: An evaluation of the technical usability of the verified data with respect to planned objectives. Data validation is performed external to the data generator (laboratory), using a defined set of performance criteria to a body of data in the evaluation process. This may include checks on some or all of the calculations in the data set and reconstruction of some or all final reported data from initial laboratory data (e.g., chromatograms, instrument printouts). It is in the data validation process that data qualifiers for each verified data are evaluated. It extends beyond the analytical method to protocols or QAPPs to address the overall technical usability of the generated data.

One hundred percent (100%) of the data will be validated according to Table 8.1 requirements by the Project QA Officer or a subcontractor experienced in conducting this type of data verification. Data will be reviewed as it is received, continuously throughout the project. If problems are uncovered as a result of the validation effort, the QA Officer and Project Manager will be immediately notified. The QA Officer or Project Manager will discuss possible corrective actions with the laboratory prior to implementation. The Project Manager will immediately notify EPA and UDEQ of any data verification or validation issues that may affect the success of the project.

Any deviations from the analytical control limits specified in Table 4.1 and 8.1 will be evaluated in terms of their effect on the data usability. Data usability will be assessed using the National Functional Guidelines for Data Review (Inorganic & Organic, February 1994). The completeness goal for the project is 90-percent valid data.

The results of the data validation and verification will be summarized in a Data Review Report, to be prepared after the completion of sampling and analysis activities at the Site.

8.3 Reconciliation with Data Quality Objectives

The data validation and verification results will be compared to the DQOs stated in Table 5.0 and with the PARCC parameters described in Table 8.0. This evaluation will summarize the QA/QC performance by PARCC criteria including completeness calculations expressing the percent complete of valid data compared to the total number of samples collected. The result of the data validation and verification will be summarized in the Data Review Report described above.

8.4 Reporting Limits

The reporting limits provided in Table 4.1 are the minimum levels that the laboratory will report analytical results without a qualifier when an analyte is detected. The laboratory can typically detect analytes at concentrations of up to an order of magnitude lower than the reporting limits; in this case, when a positive detection is less than the reporting limit, the value may be reported and qualified as an estimated concentration.

8.5 Holding Times

Holding times are storage times allowed between sample collection and sample extraction or analysis (depending on whether the holding time is an extraction or analytical holding time) when the designated preservation and storage techniques are employed. Sample preservation and holding time requirements for samples collected in the field investigations are summarized in Table 4.1. Holding times for soil samples for analysis of metals is 180 days (30 days for mercury) with no preservative. PH samples should be analyzed as soon as possible following collection. All samples will be cooled and stored at 4 degrees Celsius ±2 degrees Celsius until the requested analyses are performed.

8.6 Quality Control Analyses

To provide an external check of the quality of the field procedures and laboratory analyses, two types of QC samples will be collected and analyzed. Field replicate (duplicate) samples will be collected in order to distinguish between variability in results introduced by the field and sample handling prior to receipt by the laboratory and variability introduced by the laboratory procedures. These samples will be analyzed for metals. If non-disposable sampling equipment

is used, an equipment rinsate blank will be collected and analyzed for metals to assess potential contamination of sampling equipment for the analytes of interest. The collection and number of field QC samples that will be analyzed in this field program are discussed in Section 5.6 of this QAPP

In addition to the external QA/QC controls, the laboratory maintains internal QA procedures. Internal QC samples will include laboratory blanks (i.e., method blanks, preparation blanks), laboratory duplicates, MS/MSDs, and LCS/LCSDs, as discussed in Appendix B.

8.7 Special Training Requirements

The only special training required for this investigation is the health and safety training (29 CFR 1910.120), as described in the RI HASP (RMC, 2001) for the project.

9.0 MEASUREMENT AND DATA ACQUISITION

This section covers sample process design, sampling methods requirements, handling and custody, analytical methods, QC, equipment maintenance, instrument calibration, supply acceptance, nondirect measurements, and data management.

9.1 Sample Process Design

The general goal of the field investigation is to verify that remediation and post remedial monitoring are conducted according to the RD/RA. Sections 3.0 and 4.0 of this SAP describe the Field Sampling Plan.

9.2 Sampling Methods Requirements

Sampling equipment, containers, and overall field management are described below.

9.2.1 Sampling Equipment and Preparation

Sampling equipment required for the field program for environmental sampling, health and safety monitoring, equipment and personal decontamination, and general field operations are presented in Table 4.0 of this SAP.

Field preparatory activities include review of SOPs, procurement of field equipment, laboratory coordination, confirmation of Site access, as well as a field planning meeting attended by field personnel and QA staff. Site mobilization is described in Section 4.0 of this SAP.

9.2.2 Sample Containers

Containers for the environmental samples that will be collected during the field program are specified in Table 4.1.

9.2.3 Sample Collection

Samples collected during this field program will consist of sediment, soil, surface water and QC samples. All sample collection procedures are outlined in Section 4.4 and SOPs in Appendix A. The following SOPs apply to all applicable sample collection activities:

RMC SOP 1, Standard Procedures for Collection of Surface Water Samples
RMC SOP 2a, Standard Procedures for Collection of Surface Soil Samples
RMC SOP 5, Standard Procedures for Sample Handling, Documentation and Shipping
RMC SOP 6, Standard Procedures for Sampling Equipment Decontamination
RMC SOP 7, Standard Procedures for Collection of Particulate Samples
RMC SOP 8, Standard Procedures for XRF Field Screening
RMC SOP 9, Standard Procedures for Vegetation and Erosion Monitoring

9.3 Sample Handling and Custody Requirements

Custody and documentation for field and laboratory work are described below, followed by a discussion of corrections to documentation.

9.3.1. Field Sample Custody and Documentation

Samples analyzed through laboratories coordinated by RMC will be labeled using procedures established in RMC SOP 5 (Standard Procedures for Sample Handling, Documentation and Shipping). Sample labels will include the Site name, sample identification number, and required analyses. Additional sample collection information including the date and time of sample collection, and sampler's initials will be recorded on the labels in permanent black ink markers or pens at the time of sample collection.

9.3.2. Chain-of-Custody Requirements

A Chain-of-Custody Record will be completed at the time of sample collection. Field personnel will record the sample identification number, sampling date and time, sample matrix, sampler's initials, and analytical requirements in permanent black ink pens. Completed Chain-of-Custody Records will be reviewed for completeness prior to sample submittal. Samples will be relinquished under the Chain-of-Custody Procedures identified in RMC SOP 5 (Standard Procedures for Sample Handling, Documentation and Shipping).

9.3.3. Sample Packaging and Shipping

Samples will be hand delivered to the laboratory.

After the sample containers are sufficiently packaged, the plastic bag containing the samples will be sealed. Ice (sealed in bags) will be placed between the plastic bags and cooler.

9.3.4. Field Logbooks and Records

Documentation of field activities will be conducted in accordance with RMC SOP 5 (Standard Procedures for Sample Handling, Documentation and Shipping). The field sampling team will maintain a comprehensive field logbook that includes notes regarding instruments used, Site and weather conditions, GPS coordinates, vegetative community observations, sample time, sampler's name, analytical parameters, sample handling and chain of custody. The field activities will be recorded in bound, sequentially numbered, waterproof notebooks. All entries will be will be made in permanent black ink and will be clear, objective, and legible. Where required, representative photographs will also be taken of field activities and sample locations, and a description will be recorded in the logbook. The Field Operations Manager is responsible for maintenance and document control of the field logbooks.

9.3.5. Laboratory Custody Procedures and Documentation

Laboratory custody procedures are provided in each laboratory's QA Manual. Upon receipt at the laboratory, each sample shipment will be inspected to assess the condition of the shipping cooler and the individual samples. This inspection will include measuring the temperature of the cooler (to document that the temperature of the samples is within the acceptable criteria if cooling is required) and verifying sample integrity. The enclosed chain-of-custody records will be cross-referenced with all of the samples in the shipment. Laboratory personnel will then sign these chain-of-custody records and copies provided to EPA Quality Assurance Coordinator will be placed in the project file. The sample custodian may continue the chain-of-custody record process by assigning a unique laboratory number to each sample on receipt. This number, if assigned, will identify the sample through all further handling. It is the laboratory's responsibility to maintain internal logbooks and records throughout sample preparation, analysis, data reporting, and disposal.

9.3.6. Corrections To and Deviations From Documentation

For the logbooks, a single strikeout initialed and dated is required for documentation changes. The correct information should be entered in close proximity to the erroneous entry. All deviations from the guiding documents will be recorded in the logbook(s).

9.4 Analytical Methods Requirements

Samples collected during this project will be analyzed in accordance with standard EPA and/or nationally-accepted analytical procedures. The selected EPA-approved laboratories will adhere to all applicable QC requirements established by the subcontract. The methods to be used for chemical analysis and the associated holding times are shown in Table 4.1.

9.5 Quality Control Requirements

Field, laboratory, and internal office QC are discussed below.

9.5.1. Field Quality Control Samples

Quality control checks will be employed during field activities to ensure the quality and integrity of sample collection. Both field duplicate and equipment rinsate, if required, QC samples will be collected in the field and submitted to the appropriate laboratory for analysis, as described in Section 6.0.

All field duplicates will be collected as close as possible to the same point in time and space as the primary field sample. Field duplicate samples will be prepared at a frequency of five-percent of all laboratory samples obtained during the study, and will be handled and analyzed in the same manner as the environmental samples.

9.5.2. Laboratory Quality Control Samples

The approved EPA contract laboratory(ies) will follow all laboratory QC checks, as defined in the analytical methods listed in Section 5.6. Quality control data are necessary to determine precision and accuracy and to demonstrate the absence of interferences and/or contamination. Each type of laboratory-based QC will be analyzed at a rate of five-percent or one per batch (a batch is a group of up to 20 samples analyzed together), whichever is more frequent. Results of the QC will be included in the QC package and QC samples may consist of laboratory blanks, laboratory duplicates, MS/MSDs, and/or LCS/LCSDs, whichever are applicable, and any other method-required QC samples.

Laboratory blank samples will be analyzed to assess possible contamination so that corrective measures may be taken, if necessary. Duplicate samples are aliquots of a single sample that are split on arrival at the laboratory or upon analysis. Results obtained for two replicates that are

split in a controlled laboratory environment may be used to assess laboratory precision of the analysis. MS/MSD and LCS/LCSD analyses may be used to determine both precision and accuracy.

Both normal and QC samples will be spiked with surrogate compounds, when applicable, and a percent recovery will be calculated for each surrogate.

9.5.3. Internal Quality Control Checks

Internal QC checks will be conducted throughout the project to evaluate the performance of the project team during data generation. All internal QC will be conducted in accordance with EPA CLP methods and requirements.

9.6 Equipment Maintenance Procedures

All laboratory equipment will be maintained in accordance with each laboratory's SOPs.

9.7 Instrument Calibration Procedures and Frequency

Calibration of field and laboratory instruments is addressed in the following subsections.

9.7.1. Field Equipment

Field instruments used in the field investigation consist of a field portable XRF, GPS units used to measure sample station coordinates and conductivity and pH meters used to measure water samples. The GPS receivers require no special calibration procedure, and all measurements will be conducted according to the manufacturer's suggested procedures. There are few areas with overhead cover in the study area, and little difficulty is expected in acquiring adequate satellite signals.

Calibration of the XRF will be performed prior to use in the field on a daily basis. In all cases, the XRF will be calibrated and operated according to instructions supplied with the instrument, and calibration information will be recorded in the field log or instrument log.

Calibration of the pH meter will be performed prior to use in the field on a daily basis. In all cases, the pH meter will be calibrated and operated according to instructions supplied with the instrument, and calibration information will be recorded in the field log or instrument log. Solutions used for the calibration of pH meters will be within the expiration date supplied on the bottle label.

9.7.2. Laboratory Equipment

Calibration of laboratory equipment will be based on written procedures approved by laboratory management. Instruments and equipment will be initially calibrated and subsequently

continuously calibrated at approved intervals, as specified by either the manufacturer or more updated requirements (e.g., methodology requirements). Calibration standards used as reference standards will be traceable to the EPA, National Institute of Standards and Technology, or another nationally-recognized reference standard source.

Records of initial calibration, continuing calibration and verification, repair, and replacement will be filed and maintained by the laboratory. Calibration records will be filed and maintained at the laboratory location where the work is performed and may be required to be included in data reporting packages.

9.8 Acceptance Requirements for Supplies

Prior to acceptance, all supplies and consumables will be inspected to ensure that they are in satisfactory condition and free of defects.

9.9 Non-Direct Measurement Data Acquisition Requirements

Non-direct measurement data include information from Site reconnaissances, literature searches and interviews. The acceptance criteria for such data include a review by someone other than the author. Any measurement data included in information obtained from the above-referenced sources will determine further action at the Site only to the extent that those data can be verified.

9.10 Data Reporting

Sample results and QC data will be delivered to the EPA RPM as an electronic data deliverable (EDD) in addition to a hard-copied data package. Electronic copies of all project deliverables, including graphics, are maintained by project number. Electronic files are routinely backed up and archived.

10.0 REFERENCES

Resource Management Consultants, Inc. (RMC), 2005, Remedial Design/Remedial Action Work Plan for Richardson Flat, Site ID Number: UT980952840

Resource Management Consultants, Inc. (RMC), 2004a, Focused Remedial Investigation Report for Richardson Flat, Site ID Number: UT980952840.

Resource Management Consultants, Inc. (RMC), 2004b, Focused Feasibility Study Report for Richardson Flat, Site ID Number: UT980952840

Resource Management Consultants, Inc. (RMC), 2001, Site Health and Safety Plan for Richardson Flat, Site ID Number: UT980952840

United States Environmental Protection Agency (EPA). 1991. Management of Investigation-Derived Wastes During Site Inspections, Office of Emergency and Remedial Response, Washington, DC, OERR Directive 9345.3-02.

United States Environmental Protection Agency (EPA). 1994a. The National Functional Guidelines for Inorganic Data Review. February, with current revisions (Inorganic Guidelines).

United States Environmental Protection Agency (EPA). 1994b. Guidance for the Data Quality Objectives Process, EPA QA/G-4. September.

United States Environmental Protection Agency (EPA). 1997. EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations, QA/R-5. Draft Final, October.

United States Environmental Protection Agency, Environmental Response Team (EPA/ERT). 1999. Standard Operating Procedures (SOPs).

U.S. EPA 2003. SW-846 On-Line (http://www.epa.gov/epaoswer/hazwaste/test/main.htm)

Table 3.0. Sampling Objectives

Media/Parameters	Sampling and Analysis Objectives	Data Use
Site Soils: Cover Thickness (Phase I)	Determine thickness of cover soils.	Compare cover soil thickness to design specifications.
Site Soils: Metals (Pb and As) (Phase I)	Determine if soils located in source removal areas remaining in place meet regulatory guidelines.	Compare metals concentrations to Lead<500 ppm and Arsenic <100 ppm.
Air Quality (Particulate): Lead	Determine if air quality meets applicable standards.	Compare lead concentrations to NIOSH/ OSHA and NAAQS standards.

Table 3.0. Sampling Objectives (cont.)

Media/Parameters	Sampling objectives	Data Use
Imported Soil: Metals (Pb and As) (Phase I)	Determine if imported soil meets clean soil criteria.	Compare metals concentrations to Lead<500 ppm and Arsenic <100 ppm.
Sediment: Lead (Phase I)	Determine if impacted sediments have been removed. Determine if remediation is completed.	Compare metals concentrations to PRG (310 ppm lead).
Surface water: Dissolved and Total Zn, Pb and Cd and water quality parameters (Phase II)	Determine if waters emanating from the South Diversion Ditch meet applicable regulatory standards.	Compare metals concentrations with Utah State Water Quality Standards.
Erosion (Phase II)	Determine if erosion is occurring.	Insure that soil cover and erosional safeguards are functioning as designed.
Vegetation (Phase II)	Measure success of revegetation.	Compare revegetation to Site design specifications.

Table 4.0
Field Equipment and Supplies
Richardson Flat
Sampling and Analysis Plan

Sampling	Health & Safety	Decontamination	General
Stainless steel spoons (2)	Latex gloves (1 box)	Plastic squirt bottles (2)	GPS
Steel shovels (2)	Sunscreen	Plastic trash bags (1 box)	Wooden stakes
Stainless steel bowls (2)	Rubber boots	Deionized water (5 gallons)	Flagging (2 rolls)
XRF	Copy of HSAP	Nitric acid (10% solution - 1 gallons)	Coolers
Self-sealing plastic bags (qt.& gal. size)		Alconox (1 carton)	Copy of SAP
Field Logbook		Plastic buckets (3 5-gal)	Tape measure
Survey lathe, trimed to 6"		Scrub brushes (3)	Ice
Plastic trash bags (1 box of large - 30 count)		Sprayer (1-liter)	
0.45 um filters (5)		Plastic buckets (3 5-gal)	
Polyethylene bottles (liter & 0.5 liter)			
HNO3			
Particulate filters (20)			
Personal air pumps (3)			

TABLE 4.1
Sample Collection Guide - Target Analytes and Collection Requirements
Richardson Flat
Sample and Analysis Plan

SURFACE WATER

Parameters	Method	LRL[1]	Container	Volume[2]	Temperature[3]	Preservative	Hold Days
pH, Temperature	EPA 150.1, 170.1	NA	HDPE	Bottle 3	NA	None	1
Conductivity	EPA 120.1	NA	HDPE	Bottle 3	4°C	None	28
Cd (Total and Dissolved)	SW-846 6010B or 6020	0.004	HDPE	Bottle 1,2	4°C	2 ml HNO_3 (pH<2)	180
Zn (Total and Dissolved)	SW-846 6010B or 6020	0.01	HDPE	Bottle 1,2	4°C	2 ml HNO_3 (pH<2)	180

SURFACE SOILS

Parameters	Method	LRL[4]	Container	Volume[2]	Temperature[3]	Preservative	Hold Days
Pb (Total)	SW-846 6010B or 6020	5.7	Plastic Bag	4 oz.	4°C	N/A	180
As (Total)	SW-846 6010B or 6020	0.57	Plastic Bag	4 oz.	4°C	N/A	180

SEDIMENT

Parameters	Method	LRL[4]	Container	Volume[2]	Temperature[3]	Preservative	Hold Days
Pb (Total)	SW-846 6010B or 6020	5.7	Plastic Bag	4 oz.	4°C	N/A	180

PARTICULATES

Parameters	Method	LRL[5]	Container	Volume[2]	Temperature[3]	Preservative	Hold Days
Pb	SW-846 6010B or 6020	0.5	Filter cassette and plastic bag	>350L Air	4°C	N/A	180

N/A - Not Applicable
LRL - Laboratory Reporting Limit

Sediments
1-Plastic bag qt freezer

Water
Bottle 1 - 500 ml bottle filtered to 0.45mm and preserved with 2 ml HNO3
Bottle 2 - 500 ml bottle unfiltered and preserved with 2 ml HNO3
Bottle 3 - 500 ml bottle unfiltered and unpreserved for field parameters.

[1] All units in mg/l or mg/kg except as noted.
[2] Laboratory analysis for the above parameters will require collection of the following sample volumes/preservation at each sample station:
[3] Laboratory will measure the temperature of each cooler upon receipt to ensure proper temperature was maintained (4°C +/- 2°C)
[4] All units are Parts Per Million (ppm) based upon dry weight unless otherwise noted. Soil samples with greater than 10% moisture may require an LRL adjusted upward.
[5] Units are ug/sample - 350 liters air will allow for a calculated LRL of <1.5 ug/m^3

Reporting limits are goals. These goals are at or near method detection limits and may be impacted by sample volume and/or sample matrix.
10% field duplicates

Table 5.0
Data Quality Objectives, Data Uses, Data Type, and QC levels
Richardson Flat
Sampling and Analysis Plan

Data Quality Objectives	Existing Data Summary	Data Needs	Data Use	Analysis Type	QC Level
Determine if water discharging from South Diversion Ditch meets applicable water quality standards.	Water quality data is provided in the RI. Data provided in the RI indicate that metals concentrations at RF-6-2 meet applicable water quality criteria.	Monitor post-remedial zinc and cadmium concentrations at the terminus of the South Diversion Ditch.	Confirm that Site is not discharging zinc and cadmium.	Water quality analysis, field parameters, total and dissolved Zn, Pb and Cd.	Definitive
Confirm that the wetland sediment PRG for lead (310 ppm) is met.	Sediment data presented in the RI indicates that sediment lead concentrations in the wetland exceeds the Site PRG.	Screen sediments with XRF during remediation and obtain post remedial sediment confirmation samples from the wetland area.	Confirm that remediation is complete.	XRF field screening, soil metals analysis (Pb, dry weight).	Screening (XRF) Definitive (Laboratory)
Confirm that Site air quality meets NAAQS and OSHA standards during remediation.	None for construction activities.	Obtain air samples during remedial activities.	Confirm that Site air quality meets standards and site activities are not discharging particulate matter.	Particulate Pb in air.	Definitive
Confirm that native Soils remaining in source removal areas are not contaminated (lead <500 ppm and arsenic <100 ppm).	Data presented in the RI indicates that soils below tailings are not contaminated.	Screen soils during remediation with XRFand obtain post remedial sediment confirmation samples from the wetland area.	Confirm that remediation is complete.	XRF field screening, soil metals analysis (Pb and As, dry weight).	Screening (XRF) Definitive (Laboratory)
Confirm that soils remaining in source removal areas are not contaminated.	None	Obtain soil samples for imported cover soils.	Evaluate metals concentrations in cover soils.	Pb and As soil analysis.	Definitive
Confirm soil cover meets design specifications.	Data presented in RI/FS details thickness of current cover soils.	Soil cover thickness.	Evaluate whether soil cover meets design specifications.	Cover thickness measurement.	Definitive
Confirm that Remedial Action is complete and Site is functioning as designed (erosion and vegetation monitoring).	None - however vegetative communities were evaluated as part of the RI.	Monitor Site to determine if soil and vegetative covers are functioning as designed.	Evaluate if repairs are required.	Site survey with erosion and plant density measurements.	Definitive

TABLE 8.0
Precison, Accuracy, Representativeness, Comparability and Completeness (PARCC)
Richardson Flat
Sample and Analysis Plan

Parameter	QC Program	Evaluation Criteria	Acceptance Criteria	Recommended Corrective Actions
Precision	Field Duplicate	Relative Percent Difference (RPD)	RPDs: soil, sediment and water samples +/- 35 percent if > 5 times LRL, or, +/- LRL if < 5 times LRL	Verify the RPD calculation. If correct, determine if matrix interference or heterogeneous samples are factors in poor RPD. If matrix effects or heterogeneous samples are not observed, reanalyze the associated investigative samples and MS/MSD. If appropriate, reextract or redigest and reanalyze the associated investigative samples and MS/MSD.
	Matrix Spike/Matrix Spike Duplicate (MS/MSD)	Relative Percent Difference (RPD)	See method-specific control limits[1]	Verify the RPD calculation. If this is correct, determine if matrix interference or heterogeneous samples are factors in poor RPD. If matrix effects or heterogeneous samples are not observed, reanalyze the method duplicate and associated investigative samples.
Accuracy	Matrix Spike (MS)	Percent Recovery	See method-specific control limits[1]	Verify the matrix spike percent recovery calculations and evaluate the LCS percent recovries. If the calculations are correct and the LCS recoveries are acceptable, determine if matrix interferences is a factor in the poor recoveries. If matrix effects not observed, reanalyze the MS and associated samples. If appropriate, reextract or redigest and reanalyze the MS and associated investigative samples.
	Matrix Spike Duplicate (MSD)	Percent Recovery	See method-specific control limits[1]	Same as above.
	Laboratory Control Samples (LCS)	Percent Recovery	See method-specific control limits[1]	Verify the percent recovery calculations. Evaluate the standard to determine if it is faulty. If it is, prepare a new standard and reanalyze the LCS and associated investigative samples. If necessary, recalibrate the instrument. Do not continue analysis until problem solved.
Representativeness	Holding Times	Representative of Environmental Conditions	Holding Times Met 100 Percent	Evaluate whether data is critical to decision making. If so, resample and reanalyze for parameter exceeding holding time.
	Method Blanks	Qualitative Degree of Confidence	See method specific requirements[1]	Evaluate instrument, locate source of contamination, perform system blanks to confirm that system blanks meet performance criteria. Re-analyze method blank and associated samples. If method blank still above acceptance criteria, reextract or redigest the method blank and all associated samples.
	Equipment/Rinsate Blanks	Qualitative Degree of Confidence	Target analytes <1 X LRL; 5-10 X LRL for laboratory-inducted contaminants.	Suggests field sampling-induced contamination may have occurred. Evaluate all associated QC samples. If all other QC samples are within prescribed acceptance limits, but equipment blank is not (e.g., positive identification of target analytes observed), contact USEPA immediately to determine if resampling and/or reanalysis required.
	Field Duplicates	Qualitative Degree of Confidence	90 Percent of Field Duplicates Meet RPD Goals	If acceptance criteria not met, evaluate reasons for not meeting criteria (i.e., matrix interferences or heterogeneous samples) and make recommendations on whether resampling and/or reanalysis is necessary to improve degree of confidence.
Comparability	Standard Units of Measure	Qualitative Degree of Confidence	Laboratory Methods Followed	Revise analytical reports with correct units.
	Standard Analytical Methods		SOPs Followed	If SOPs not followed, evaluate whether reanalysis is necessary to obtain reliable data.
Completeness	Complete Sampling	100 Percent Valid[2] Samples	90 Percent Valid[2] Data	If not enough samples were collected for project needs, collect and analyze additional samples for parameters needed for key decisions.

[1] Laboratory Control limits are specific to individual analytical/digestion methods and any deviation outside control limits are reported (see method-specific SOPs in Appendix A).
[2] Valid means that samples meet all evaluation criteria (i.e., are not rejected for any reason).

Precision is a measure of how repeatable data are and is often measured by sample duplicates.
Accuracy is a measure of how close the data are to the actual, or real value, measured by certified reference materials and matrix spikes.
Representativeness is a measure of how representative a sample is of the sample population and is achieved by accurate sampling procedures and appropriate sample homogenization.
Comparability looks at ongoing projects and how variable one set of data is relative to another. Comparability helps to measure the scientific consistency of the system to past work.
Completeness is a measure of how many data points collected are usable; 90% usable data is considered to be an acceptable value for completeness.

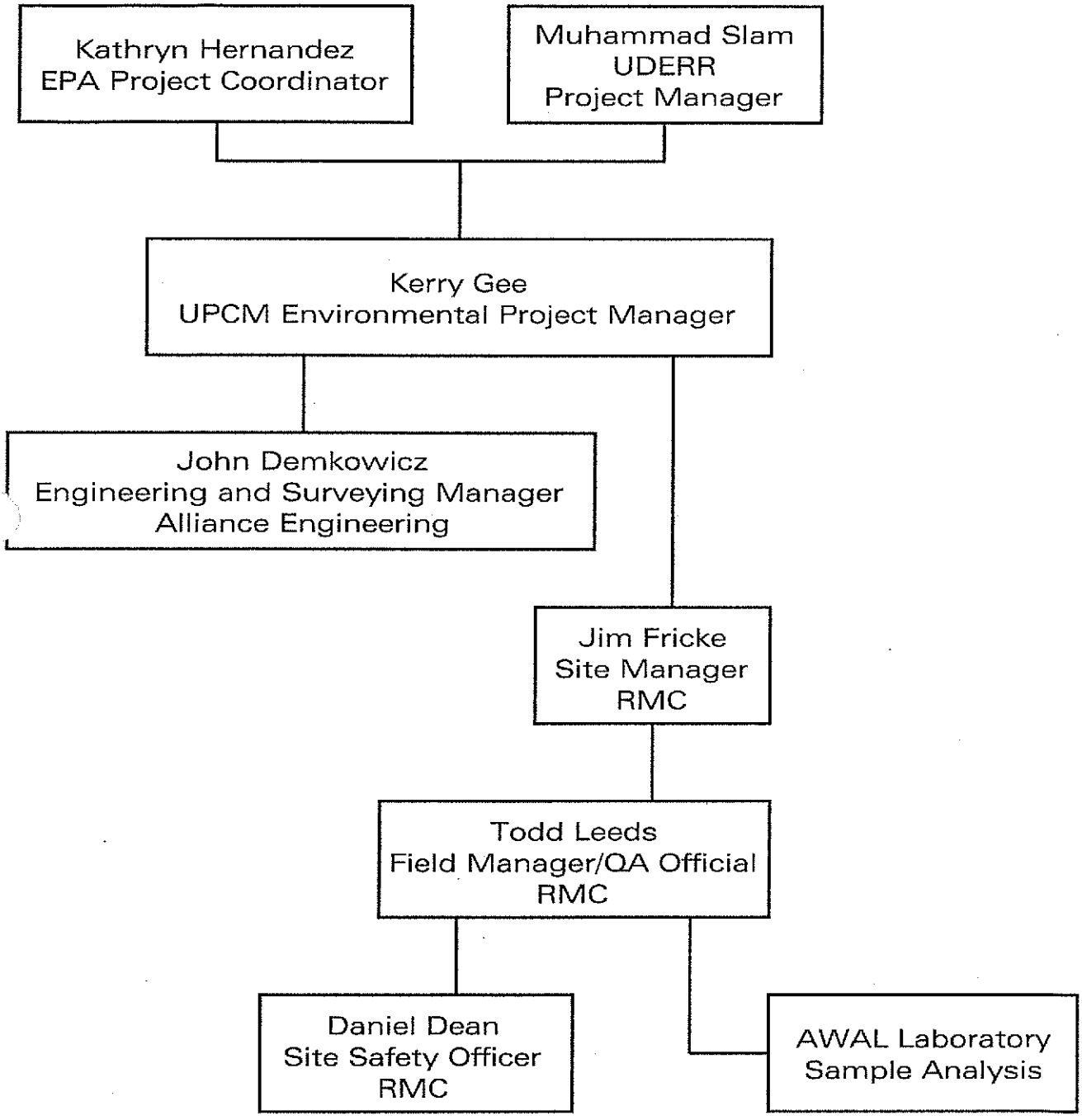
TABLE 8.1
Data Validation and Verificaiton Requirements
Richardson Flat
Sample and Analysis Plan

Data Validation and Verification Steps		Data Validation and Verification Methods
Samples were collected according to established locations and frequencies.	→	Comparison with Sampling Plan
Sample collection and handling followed established procedures.	→	Review of field notes, field procedures and COCs
Appropriate analytical methods were used; internal laboratory calibration checks were performed according to the method-specified protocol.	→	Review of analytical methods and case narratives provided with laboratory reports. Documentation of any communications with laboratory concerning problems or corrective actions.
Required holding times and laboratory reporting limits were met.	→	Comparison with established holding times and LRLs.
Field Duplicates for QA/AC	→	Field duplicates met acceptance criteria tabulation of RPDs and comparison with PARCC parameters
Acceptance criteria (see Table 8.0) for field and laboratory QC samples (field blanks, field dups, equipment/rinsate blanks, method blanks, LCS) were met.	→	Tabulation of RPDs and spike recoveries, and direct comparison with method-specific acceptance criteria (see SOPs in Appendix A). Comparison with PARCC parameters.
Appropriate steps were taken to ensure the accuracy of data reduction, including reducing data transfer errors in the preparation of summary data tables and maps.	→	Maintain permanent file for laboratory hardcopies of analysis reports. Minimize retyping of data and error check data entered into database, tables, maps, etc.

RPD = Relative Percent Difference
LRL = Laboratory Reporting Limit

Figures

FIGURE 5.0 - Richardson Flat RD/RA Organizational Chart



rf-org-chart.dwg

APPENDIX A

STANDARD OPERATING PROCEDURES

RMC SOP 1
STANDARD PROCEDURES FOR COLLECTION OF SURFACE WATER SAMPLES

1.0 Purpose

This SOP describes the procedures that will be used for collection of surface water samples. The procedures will ensure that samples are collected and handled properly and that appropriate documentation is completed.

1.0 Sampling Equipment:

- Log forms / Field notebook / Chain of Custody Forms (COC) – Documentation of sample activities, field notes and sample custody.
- Sample containers – Containers provided by laboratory for the collection, storage and transportation of samples.
- Direct reading instruments – field instruments to measure pH, conductivity and temperature.
- Disposable sampling gloves – to prevent exposure to water and the prevention of cross-contamination.
- Custody seals – seals to be placed on sample containers to maintain sample integrity.
- 0.45 um filter apparatus with inert filters – for filtering samples in preparation for the analysis of dissolved metals.
- Nitric acid (HNO_3, supplied by the analytical laboratory) – for sample preservation.
- Water velocity meter and tape measure – to measure stream flow (where applicable).
- Distilled water – for rinsing direct reading instruments.
- Custody seals – seals to be placed on sample containers to maintain sample integrity.

2.0 Procedure

Sample bottles will remain sealed until the water sample is collected. At that time, the bottle lid will be removed and placed, top down, in an appropriate place. The sample bottle will be placed under the flow of water. If wading is required for sample collection, the sample must be collected upstream of wading personnel to avoid the sampling of suspended sediments. The container will be rinsed three times. After rinsing the container will be completely filled; any overflow of the sample container will be kept to a minimum. Sediment disturbance shall be kept to an absolute minimum. The sample cap will then be replaced on the sample bottle. All surface water samples will be collected in accordance with containers, volumes, preservatives, temperatures and holding times as outlined in Table 2 of the Sampling and Analysis Plan.

3.0 Dissolved Metals Analysis

Surface water samples collected for analysis of Dissolved (D) Metals will be a minimum volume of 500 ml, collected in a poly or glass container. The samples will be field filtered. The field filtering methodology will include the following steps:

1: Sample shall be collected in a 1000 ml bottle.

2: Sample is poured into the top of the disposable plastic filter.

3: Vacuum pump is attached to the filter and pumped.

4: When the bottom compartment of the filter is full, the water is to be transferred into a 500.ml sample container which shall be rinsed three times, the sample will be preserved with 2 ml of nitric acid (HNO_3), sufficient to bring the sample to pH <2.

5: The pH level in samples will be verified using pH paper before bottles are sealed. The pH level in samples will be verified using pH paper before bottles are sealed.

4.0 Total Metals Analysis

Surface water samples collected for analysis of Total (T) Metals will be a minimum volume of 500 ml, collected in a poly or glass container, and preserved with 2 ml of nitric acid (HNO_3), sufficient to bring the sample to pH <2. The pH level in samples will be verified using pH paper before bottles are sealed.

5.0 Cations/Anions and Total Suspended Solids

Cations/Anions and Total Suspended Solids samples shall be collected in accordance with the methodologies outlined in the Procedure section of this SOP. Samples will not be preserved.

6.0 Stream flow Measurement

Stream flow volumes shall be measured during surface water sampling activities. To minimize sediment disturbance during sampling, the stream flow measurements should be conducted either downstream from the sampling point or after the completion of sample collection. RMC uses an electronic flow meter. The procedure for measuring stream flows is as follows:

1: Measure the width of the stream and divide the width into 0.5 foot increments.

2: At the midpoint of each 0.5 foot increment record the total depth of the stream. The water velocity shall be measured at 0.6 of the total height of the water (e.g. if the water is one foot deep the velocity is measured at a depth of 0.4 foot from the surface or 0.6 feet from the streambed).

3: Turn the electronic stream meter gauge on. Set the meter to record the average velocity. Insert the stream flow gauge into the water at the midpoint of each segment with the arrow pointing in the direction of flow. Measure the velocity for approximately one minute and record the average.

4: Calculate the stream flow by calculating the area of each 0.5 foot wide segment by multiplying the width times depth. To obtain the flow volume for each 0.5 wide segment multiply the area of the segment by the average flow velocity for the segment. The obtain the total stream flow add the total stream flow for each segment. An Excel spreadsheet is typically used for the calculations.

Calculations:

Segment flow volume = depth of 0.5 foot segment x width x flow velocity (feet/sec.) = cubic feet/ second
Total flow volume = sum of segment flow volumes.

7.0 Labeling

Each sample will be labeled with the following information:

- Sample identification;
- Project number/name;
- Analyses requested;
- Preservatives (if required);
- Date/time collected; and
- Samplers initials.

8.0 Documentation

Field activities shall be recorded in a hard bound field notebook. Field notes shall include all pertinent information including but not limited to:

- Date and time samples were collected;
- Physical description of sample area;
- Identification of samples collected;
- Total number of samples collected;
- Total number of samples collected from each sample location;
- Physical description of samples;
- Preservatives used for samples;
- Sample container types;
- Filtered vs. Unfiltered samples (water);
- Analysis to be performed;
- Weather conditions;
- Hand sketches of subject area(s); and
- Description and date of any photograph(s) taken.

Sample handling and Chain of Custody documentation shall be in accordance with RMC SOP 5 found in this document.

9.0 Demobilization

After Decontamination, sample equipment will be stored in the appropriate, clean containers. Any equipment that suffers damage or excessive wear while conducting sampling will be labeled and reported to the equipment manager for the necessary maintenance, repair and/or replacement.

SOP 2a
STANDARD PROCEDURES FOR COLLECTION OF SURFACE SOIL SAMPLES

1.0 Purpose

This SOP describes the procedures that will be used for sampling surface soils from ground surface to a maximum of 18 inches below surface. Samples will be collected with a Decontamination shovel or hand auger/probe. Specific soil sampling locations will be determined from the project work plan.

2.0 Sampling Equipment:

- Hand Auger/Probe and/or Shovels – For the collection of soil samples below the ground surface.
- Log forms / Field notebook / Chain of Custody (COC) - Documentation of sample activities, field notes and sample custody.
- Sample containers - Containers provided by laboratory for the collection, storage and transportation of samples.
- Stainless steel sample spoons – For the collection of surface soil samples and composite sample mixing.
- Sample location staking – For the marking and identification of sample locations. Staking should be easily visible for surveying.
- Disposable sampling gloves – to prevent exposure to soils and the prevention of cross-contamination.
- Custody seals – seals to be placed on sample containers to maintain sample integrity.

3.0 Decontamination Equipment:

- 5 gallon buckets – For washing and the collection of rinsate.
- Alconox - Soap
- Scrub brushes – For cleaning sampling equipment.
- Distilled water – For final equipment rinse.
- Culinary tap water – for equipment rinse.
- Garbage bags – for clean equipment storage.

4.0 PROCEDURE:

All samples shall be collected using Decontaminated equipment. Decontamination procedures are detailed in RMC SOP 6.

4.1 Discrete Samples

If significant vegetation, rocks, or debris prevent collecting the surface samples then the upper 2-3 inches of soil will be scraped away from the sample location with a shovel or stainless steel spoon. The underlying soil will then be collected and placed into sample containers with a stainless steel spoon or gloved hand. Composite samples will be homogenized as described below. Coarse grained soils, gravel and rock fragments will be removed wherever possible.

4.2 Composite Samples

Composite samples will be collected (as described above) by placing sub samples into a stainless steel mixing bowl or a clean plastic bag, or by hand with new, clean sampling gloves. The sample will be homogenized with a stainless steel spoon or gloved hand. The homogenized soil will be packaged in a laboratory-supplied sample container, labeled and placed in a cooler to maintain temperature.

4.3 Sediment Samples

Sediment samples will be collected from depths of up to 10 cm using a procedure similar to that used for discrete surface soil samples.

5.0 Sample Preparation

Soil Samples collected for human health risk assessment shall be sieved to <250 microns. The <250 micron fraction is then analyzed for metals. For ecological screening/risk assessment purposes, sieving should not occur. Sieving shall be performed by the laboratory.

6.0 Labeling

Each soil sample will be labeled with the following information:

- Sample identification;
- Project number/name;
- Analyses requested;
- Date/time collected; and
- Samplers initials.

7.0 Documentation

Field activities shall be recorded in a hard bound field notebook. Field notes shall include all pertinent information including but not limited to:

- Date and time samples were collected;
- Physical description of sample area;
- Identification of samples collected;
- Total number of samples collected per sampling event;
- Total number of samples collected from each sample location;
- Physical description of samples;
- Preservatives used for samples;
- Sample container types;
- Filtered vs. Unfiltered samples (water);
- Analysis to be performed;
- Weather conditions;
- Hand sketches of subject area(s); and
- Description and date of any photograph(s) taken.

Sample handling and Chain of Custody documentation shall be in accordance with RMC SOP 5 found in this document.

8.0 Demobilization

After Decontamination, sample equipment will be stored in the appropriate, clean containers. Any equipment that suffers damage or excessive wear while conducting sampling will be labeled and reported to the equipment manager for the necessary maintenance, repair and/or replacement.

SOP 2b

HAND AUGER SOIL SAMPLING

1.0 Introduction

Hand auger equipment will be used for collecting shallow soil samples to approximately 5 feet below ground surface. This SOP describes the procedures for collecting soil samples using hand auger equipment.

2.0 Sampling Equipment:

- Hand augers
  a. auger barrel – for the collection of clay rich soils.
  b. Sand auger barrel – for the collection of sandy soils.
  c. Extension rods – For connecting the sample barrel to the handle
  d. T handle- for turning the auger assembly.
- Two crescent wrenches – For attaching/breaking down the hand auger.
- Tape measure – for the measurement of sample depths/intervals.
- Log forms / Field notebook / Chain of Custody (COC) - Documentation of sample activities, field notes and sample custody.
- Sample containers – for sample storage and transportation.
- Disposable sampling gloves – to prevent exposure to soils and the prevention of cross-contamination.
- Surface patching supplies, if necessary (asphalt patch/post mix)
- Stainless steel bowl or sealable plastic bags for mixing composite samples.
- Custody seals – seals to be placed on sample containers to maintain sample integrity.

3.0 Decontamination Equipment:

- 5 gallon buckets – For washing and the collection of rinsate.
- Alconox - Soap
- Scrub brushes – For cleaning sampling equipment.
- Distilled water – For final equipment rinse.
- Culinary tap water – for equipment rinse.
- Garbage bags – for clean equipment storage.

4.0 Preliminaries

All boring locations will be determined using the project specific Work Plan. Arrangements will be made for the location of underground utilities using Blue Stakes. A private locating service will be used for utilities that are not covered by Blue Stakes.

5.0 Procedures

The borehole will be advanced using the clay bucket for fine-grained soils and the sand bucket for coarse-grained soils. Each auger bucket of soil will be described and recorded on the soil boring log. Soil samples selected for laboratory analysis will be placed in a laboratory supplied container.

6.0 Labeling

Each soil sample will be labeled with the following information:

- Sample identification;
- Project number/name;
- Analyses requested;
- Date/time collected; and

- Samplers initials.

7.0 Documentation

Field activities shall be recorded in a hard bound field notebook. Field notes shall include all pertinent information including but not limited to:

- Date and time samples were collected;
- Physical description of sample area;
- Identification of samples collected;
- Total number of samples collected per sampling event;
- Total number of samples collected from each sample location;
- Physical description of samples;
- Preservatives used for samples;
- Sample container types;
- Filtered vs. Unfiltered samples (water);
- Analysis to be performed;
- Weather conditions;
- Hand sketches of subject area(s); and
- Description and date of any photograph(s) taken.

Sample handling and Chain of Custody documentation shall be in accordance with RMC SOP 5 found in this document.

8.0 Decontamination

All samples shall be collected using Decontaminated equipment. Decontamination procedures are detailed in RMC SOP 6.

9.0 Demobilization

After Decontamination, sample equipment will be stored in the appropriate storage containers. If any equipment is damaged while conducting soil sampling, the damaged equipment will be labeled and reported to the equipment manager for maintenance or replacement.

SOP 2c

GEOPROBE SAMPLING

1.0 Introduction

Geoprobe™ sampling equipment will be used to advance shallow soil borings (30 feet or less) to collect soil and groundwater samples and for sites where access restrictions prevent mobilization of a drill rig. Standard operating procedures for geoprobe soil and groundwater sampling are described below.

2.0 Preliminaries

Geoprobe sample locations will be marked or staked in the field and coordinated with the RMC project manager and, if necessary, the client project manager. Blue Stakes utility clearance will be requested for each boring location prior to geoprobe sampling. Borings will be located at least two feet from marked underground utilities.

All sampling equipment will be Decontaminated prior to mobilizing to the site. This equipment includes all geoprobe rods, geoprobe samplers, and stainless steel bowls and spoons.

3.0 Geoprobe Equipment and Procedures

Soil borings will be advanced and sampled using a geoprobe hydraulic hammer mounted to a truck, van, four-wheeler, or small tractor. Each borehole will be started by hydraulically hammering a 3 foot length of 1 inch outside diameter steel drill rod with a stainless steel sample collection tube into the ground. Each sample tube shall be Decontaminated prior to use. The borehole will be advanced in 3 foot increments by adding 3 foot sections of flush threaded drill rod to the drill stem. No lubricants or additives will be used while advancing geoprobe borings.

4.0 Soil Sampling Equipment

The following equipment will used to conduct soil sampling:

- Log forms / Field notebook / Chain of Custody (COC) - Documentation of sample activities, field notes and sample custody.
- Geoprobe core sampler (supplied by the geoprobe contractor).
- New sample liners (supplied by the geoprobe contractor).
- New sample liner end caps (supplied by the geoprobe contractor).
- Disposable sampling gloves – to prevent exposure to soil and water as well as the prevention of cross-contamination.
- Sealable plastic bags – for sample storage.
- Laboratory supplied glass soil sample jars and labels (optional).
- Razor blade knife – for splitting open sample tubes.
- Stainless steel bowl and spoon – for mixing composite samples.
- Custody seals – seals to be placed on sample containers to maintain sample integrity.

5.0 Decontamination Equipment:

- 5 gallon buckets – For washing and the collection of rinsate.
- Alconox - Soap
- Scrub brushes – For cleaning sampling equipment.
- Distilled water – For final equipment rinse.
- Culinary tap water – for equipment rinse.
- Garbage bags – for clean equipment storage.

6.0 Decontamination

All samples shall be collected using Decontaminated equipment. Decontamination procedures are detailed in RMC SOP 6.

7.0 Soil Sampling

Samples will be collected as specified in the site specific sampling plan. At a minimum, soil samples will be collected at 5 foot intervals if lithologic information is needed. Each soil sample will be collected in a 2 foot long lined core sampler. The sampler will be attached to the drill rod, lowered to the sample interval and then hydraulically hammered two feet into the subsurface.

8.0 Groundwater Sampling

To facilitate the collection of groundwater samples at sites where the water table is penetrated, a temporary well point will be installed in the geoprobe borehole. After the water table has been encountered, the borehole will be advanced at least three more feet to ensure adequate sample volume. The well point may consist of either a three foot long stainless steel screen, attached to polyethylene tubing, or a length of 3/8inch polyethylene tubing with perforations in the bottom 3 feet. New tubing and well screens will be used for each well point. After approximately 15 minutes, a peristaltic pump will be attached to the tubing to obtain groundwater.

Groundwater samples shall be handled in accordance to the methods detailed for the handling/treatment of surface waters samples in RMC SOP1.

9.0 Labeling

Each sample will be labeled with the following information:

- Sample identification;
- Project number/name;
- Analyses requested;
- Preservatives (water samples);
- Date/time collected; and
- Samplers initials.

10.0 Documentation

Field activities shall be recorded in a hard bound field notebook. Field notes shall include all pertinent information including but not limited to

- Date and time samples were collected;
- Physical description of sample area;
- Identification of samples collected;
- Total number of samples collected per sampling event;
- Total number of samples collected from each sample location;
- Physical description of samples;
- Preservatives used for samples;
- Sample container types;
- Filtered vs. Unfiltered samples (water);
- Analysis to be performed;
- Weather conditions;
- Hand sketches of subject area(s); and
- Description and date of any photograph(s) taken.

Sample handling and Chain of Custody documentation shall be in accordance with RMC SOP 5 found in this document.

11.0 Boring Abandonment

After all soil and groundwater samples have been collected, each soil boring will be backfilled with granular bentonite. Borings that were drilled through asphalt or concrete will be backfilled with granular bentonite to within six inches of the ground surface and the asphalt and concrete cores will be restored.

12.0 Demobilization

After the equipment has been rigged down and loaded, the site will be cleaned and restored as close to its original condition as possible. All sampling equipment will be Decontaminated prior to mobilizing to the next geoprobe sample location.

SOP 3a

HOLLOWSTEM AUGER DRILLING, SOIL SAMPLING AND MONITORING WELL INSTALLATION.

1.0 Introduction

Hollowstem auger drilling techniques will be used to advance intermediate depth borings of 100 feet or less. Standard operating procedures for hollowstem auger drilling and soil sampling are described below.

2.0 Preliminaries

Final soil boring locations will be marked or staked in the field and coordinated with the RMC project manager and, if necessary, the client project manager. Blue Stakes utility clearance will be requested for each drilling location to identify any subsurface utilities prior to drilling and sampling. If required, drilling and/or monitoring well permits will be requested by supplying the appropriate forms to the corresponding regulatory agency.

Boring locations will be located the following distances from overhead power lines:

Power Lines Nominal System (kV)	Minimum Required Clearance (ft)
0-50	10
51-100	12
101-200	15
201-300	20
301-500	25
501-750	35
751-1000	45

All drilling and sampling equipment will be Decontaminated with a steam cleaner prior to drilling. This equipment includes all drill pipe, auger flights, split-spoon samplers, brass sleeves, stainless steel bowls and spoons, tools, and non-packaged well screen and casing. Steam cleaning will be conducted after placing equipment, tools, and non-packaged screen and casing on racks or sawhorses to keep them off the ground. After steam cleaning is completed, the equipment will remain off the ground until it is used. Borings will be located according to the site specific work plan. No borings will be drilled within 5 feet of marked underground utility lines or within 10 feet of active overhead power lines. Boring locations will be adjusted, as necessary.

3.0 Drilling Equipment and Procedures

A truck mounted hollow stem auger drill rig will be used to drill borings of 100 feet or less. Augers will be sized to accommodate the well casing diameter, if a well is to be installed in the borehole. If flowing sands are encountered a center plug will be used to prevent liquefied sands from entering the inside of the auger string during monitoring well installation. No lubricants, circulating fluid, drilling muds, or other additives will be used during drilling.

4.0 Soil Sampling Equipment

The following equipment will be used to conduct soil sampling:

- Log forms / Field notebook / Chain of Custody Forms (COC) – Documentation of sample activities, field notes and sample custody.
- Split-spoon samplers and sand catcher (supplied by the driller)
- New sample liners (supplied by the drilling contractor).
- New sample liner end caps (supplied by the drilling contractor).

- Disposable sampling gloves – to prevent exposure to soil and water as well as the prevention of cross-contamination.
- Sealable plastic bags – for sample storage.
- Laboratory supplied glass soil sample jars and labels (optional).
- Razor blade knife – for splitting open sample tubes.
- Stainless steel bowl and spoon – for mixing composite samples.
- Custody seals – seals to be placed on sample containers to maintain sample integrity.

5.0 Decontamination Equipment:

- 5 gallon buckets – For washing and the collection of rinsate.
- Alconox - Soap
- Scrub brushes – For cleaning sampling equipment.
- Distilled water – For final equipment rinse.
- Culinary tap water – for equipment rinse.
- Garbage bags – for clean equipment storage.

6.0 Monitoring Well Equipment

Monitoring well equipment shall be supplied by the drilling contractor.

- Well screen - materials and intervals to be based on site conditions or specified in Workplans and/or Sample analysis plans. Screen size to be determined based on specific site conditions.
- Well casing - materials and intervals to be specified in Workplans and/or Sample analysis plans.
- Sand and/or gravel pack – gradation to be determined based on site conditions.
- Betonite well seal – to provide annular well seal.
- Concrete – for well surface seal.
- Locking standpipe – to protect well assembly.
- Water proof locking well cap – to seal well and tamper prevention.
- Total depth probe – to measure the total depth of the open borehole and/or monitoring well annular pack.
- File – to cut a datum notch in the top of the well assembly.

7.0 Decontamination

All samples shall be collected using Decontaminated equipment. Decontamination procedures are detailed in RMC SOP 6.

8.0 Soil Sampling Procedures

Samples will be driven at intervals specified in the work plan. At a minimum, samples will be driven at 5 foot intervals, if lithologic data is needed. If loose, unconsolidated soils are encountered, a sand catcher will be placed at the end of the sampler so that unconsolidated soils are not lost as the sampler is retrieved from the borehole. The sampler will be advanced by blows from a 140-pound downhole hammer. The number of blows required to drive the sampler 6 inches will be recorded on the Soil Boring Log Form.

Each site-specific sampling plan will identify the appropriate sample containers used to collect soil samples. If sample analytes do not include volatile or semi-volatile organic compounds, laboratory supplied glass jars may be used. Otherwise, samples should be submitted in brass or plastic (for inorganic analyses) sleeves.

Sleeves in the sampler will be separated using a stainless steel putty knife and the soil between the sleeves will be carefully cut so that the soil within the sleeve is flush at each end. Each sleeve will be sealed with an end cap. Each sleeve will be labeled with the sample identification and immediately placed in an iced

cooler to maintain a temperature of 4°C. The remaining sample(s) will be used for soil classification. Samples may be removed from the sleeves for the mixing of composite samples.

9.0 Soil Boring Abandonment Procedures

Soil borings not used for well installations will be backfilled. If water is not encountered in the boring, the boring will be backfilled with drill cuttings. If water is encountered, the saturated portion of the boring will be backfilled with granular bentonite. Cuttings will be used to backfill the remainder of the boring. Borings that were drilled through asphalt or concrete will be patched to match existing conditions.

10.0 Storage and Disposal of Drill Cuttings

Drill cuttings and unused soil samples will disposed of on-site within the tailings impoundment.

11.0 Monitoring Well Installation

Monitoring well installation will occur in completed soil borings according to the procedure detailed below:

1: A soil boring shall be drilled to the anticipated total depth of the monitoring well.

2: The center tube and bit shall be removed from the auger assembly.

3: If flowing and/or heaving sands are encountered a center plug shall be used. If a center plug is required the auger assembly shall be removed from the hole and a new wood or plastic center plug will be placed at the base of the bottom section of auger. The auger will then be redrilled to the total depth of the borehole.

4: The monitoring well will assembly will be assembled and lowered into the center of the auger until the well is resting on the bottom of the borehole. The well casing will installed so that the top of the well assembly is approximately two to three feet above the ground surface. The well assembly will be handled using clean disposable gloves. If a center plug is used the well shall be lowered until the well assembly is resting on the center plug. The well will then be lifted slightly and dropped to release the center plug.

5: The sand/gravel pack will be poured into the annular space between the well assembly and the inner wall of the auger assembly. The sand/gravel pack shall be poured in three foot intervals. A Decontaminated total depth probe shall be used to measure the depth of the sand/gravel pack. Upon the completion of a three foot section of sand/gravel pack the auger shall be lifted two feet. This will allow the sand pack to fill the annular space between the walls of the borehole and the well assembly while keeping a portion of the sand/gravel pack inside of the auger assembly. This will prevent the collapse of the borehole and assuring the complete filling of the annular space between the borehole and monitoring well assembly. The sand/gravel pack installation shall continue until the sand/gravel pack is two feet above the top of the well screen.

6: Upon the completion of the sand/gravel pack an annular bentonite well seal shall be installed. The annular well seal will consist of bentonite pellets or chips. The bentonite seal shall be installed using the same procedure as outlined above for the sand/gravel pack. The bentonite well seal shall be installed to a depth of two feet below ground surface.

7: Upon the completion of the bentonite well seal, a cement surface seal and stand-pipe shall be installed. A steel stand-pipe shall be inserted into the bore hole to a depth of two feet. The stand-pipe shall contain a locking cover. The standpipe and cover assembly will be used to prevent unauthorized access to the well. The cement well seal shall be installed to ground surface in the annular space between the well casing and the inner wall of the stand-pipe. Cement will also be placed in the annular space between the outer wall of the stand-pipe and the wall of the borehole. The outer cement seal shall be configured to slope away from the well and hence to aid in the prevention of surface water runoff flowing into the well.

8: Upon the completion of well construction a V-shaped notch shall be cut into the top of the well casing. This notch shall act as a permanent datum point for surveying. The stand-pipe shall be locked upon the completion of well construction activities.

9: The well shall be surveyed according to the datum requirements specified in individual Workplans and/or Sample Analysis Plans.

12.0 Labeling

Each sample will be labeled with the following information:

- Sample identification;
- Project number/name;
- Analyses requested;
- Date/time collected; and
- Samplers initials.

13.0 Documentation

Field activities shall be recorded in a hard bound field notebook. Field notes shall include all pertinent information including but not limited to:

- Date and time samples were collected;
- Physical description of sample area;
- Lithologic descriptions of soils encountered;
- Identification of samples collected;
- Total number of samples collected per sampling event;
- Total number of samples collected from each sample location;
- Physical description of samples;
- Preservatives used for samples;
- Sample container types;
- Analysis to be performed;
- Well construction details;
- Weather conditions;
- Hand sketches of subject area(s); and
- Description and date of any photograph(s) taken.

Sample handling and Chain of Custody documentation shall be in accordance with RMC SOP 5 found in this document.

14.0 Demobilization

After the site has been cleaned and restored as close to its original condition as possible. All drilling and sampling equipment will be Decontaminated with a steam cleaner prior to drilling and sampling the next soil boring.

SOP 3B
STANDARD PROCEDURES FOR MONITORING WELL DEVELOPMENT

1.0 Purpose

This SOP describes the procedures that will be used for developing monitoring wells after installation activities have been completed. Well development ensures that drilling fluids and/or sand pack materials are removed from the well prior to sampling and that water from the aquifer enters the well as designed.

2.0 Equipment

- Decontaminated pump/bailer or surge block.
- Direct reading instruments – field instruments to measure pH, conductivity and temperature.
- Water level probe – to measure water level.
- Total depth probe – to measure total depth of well.
- Disposable sampling gloves – to prevent exposure to water and the prevention of cross-contamination.
- Field notebook – for recording field data.
- Clean new twine – for lifting bailer and/or surge block.

3.0 Decontamination Equipment

- 5 gallon buckets – For washing and the collection of rinsate.
- Alconox - Soap
- Scrub brushes – For cleaning sampling equipment.
- Distilled water – For final equipment rinse.
- Culinary tap water – for equipment rinse.
- Garbage bags – for clean equipment storage.

4.0 Procedure

After the monitor well has been installed the well will require development to ensure that all materials introduced during installation are removed and that water entering the well is representative of the aquifer.

Measure the total depth of well with sounding device, measure standing water level and determine well bore volume (V):

V in gallons $=\pi r^2 h \times 7.48$

Where $\pi = 3.14$
r = radius of well casing converted to feet
and h = Water level – total depth of well (determined from drillers log or previous well sounding)

Purge three (3) well volumes of water from the well and measure pH, conductivity and temperature from the 3rd well volume. Continue to purge the well until there are three consecutive readings from the field measurements that have similar values and the water is clear and the turbidity is low. The pH, conductivity and temperature should stabilize when the well is properly developed.

5.0 Documentation

Field activities shall be recorded in a hard bound field notebook. Field notes shall include all pertinent information including but not limited to:

- Water level at start and end of development activities;
- Calculated well volume;

- Log of field pH, temperature and conductivity readings;
- Physical characteristics of water (color and turbidity) during development process;

6.0 Decontamination

Clean well development equipment according to procedures outlined in RMC SOP 6.

7.0 Demobilization

After Decontamination, sample equipment will be stored in the appropriate, clean containers. Any equipment that suffers damage or excessive wear while conducting sampling will be labeled and reported to the equipment manager for the necessary maintenance, repair and/or replacement.

SOP 3C
STANDARD PROCEDURES FOR GROUNDWATER SAMPLING

1.0 Purpose

This SOP describes the procedures that will be used for collecting groundwater samples. Samples will be collected with a new disposable bailer and/or a Decontaminated downhole pump. Specific monitoring well locations will be determined from the project work plan.

2.0 Sampling Equipment:

- Log forms / Field notebook / Chain of Custody Forms – Documentation of sample activities, field notes and sample custody.
- Sample containers – Containers provided by laboratory for the collection, storage and transportation of samples.
- Direct reading instruments – field instruments to measure pH, conductivity and temperature.
- Disposable sampling gloves – to prevent exposure to water and the prevention of cross-contamination.
- Custody seals – seals to be placed on sample containers to maintain sample integrity.
- 0.45 um filter apparatus with inert filters – for filtering samples in preparation for the analysis of dissolved metals.
- Nitric acid (HNO_3, supplied by the analytical laboratory) – for sample preservation.
- Distilled water – for rinsing direct reading instruments.
- Water level probe – to measure water level
- Disposable bailers – to extract water from monitoring wells
- Clean new twine – to lift bailers out of wells.
- Downhole pump – if required for deep wells.
- Water level probe – to measure water level.
- Field notebook – for recording field data.

3.0 Decontamination Equipment

- 5 gallon buckets – For washing and the collection of rinsate.
- Alconox - Soap
- Scrub brushes – For cleaning sampling equipment.
- Distilled water – For final equipment rinse.
- Culinary tap water – for equipment rinse.
- Garbage bags – for clean equipment storage.

4.0 Procedure

Unlock and open the well, obtain a water level by inserting a Decontaminated water level probe into the well and measuring the standing water surface to the established datum point on the top of the well head. The established datum point can be installed by using a file to insert a notch in the PVC casing.

Purge the well with appropriate water removal device (Decontaminated bailer/pump or disposable bailer). A total of three well bore volumes of water are normally removed.

Determine the well volume (V) by the following formula:

V in gallons $=\pi r^2 h \times 7.48$

Where $\pi = 3.14$
r = radius of well casing converted to feet
and h = Water level – total depth of well (determined from drillers log or previous well sounding)

Pump or bailer discharge during purging is directed to a bucket or container to determine purge rate.

Samples are collected after a sufficient purge volume is withdrawn. Bottles are filled directly from discharge from the well or from another clean container.

After the bottles are filled, the appropriate preservatives are added, if required. The pH level in samples will be verified using pH paper before bottles are sealed.

If dissolved metals analysis is required, filtration is required and the samples will be field filtered. The field filtering methodology will include the following steps:

1: Sample shall be collected in a 1000 ml bottle.

2: Sample is poured into the top of the disposable plastic filter.

3: Vacuum pump is attached to the filter and pumped.

4: When the bottom compartment of the filter is full, the water is to be transferred into a 500 ml sample container which shall be rinsed three times, the sample will be preserved with 2 ml of nitric acid (HNO_3), sufficient to bring the sample to pH <2.

5: The pH level in samples will be verified using pH paper before bottles are sealed. The pH level in samples will be verified using pH paper before bottles are sealed.

5.0 Labeling

Each soil sample will be labeled with the following information:

- Sample identification;
- Project number/name;
- Analyses requested;
- Preservatives;
- Date/time collected; and
- Samplers initials

6.0 Documentation

Field activities shall be recorded in a hard bound field notebook. Field notes shall include all pertinent information including but not limited to:

- Date and time samples were collected;
- Physical description of sample area;
- Lithologic descriptions of soils encountered;
- Identification of samples collected;
- Total number of samples collected per sampling event;
- Total number of samples collected from each sample location;
- Physical description of samples;
- Preservatives used for samples;
- Sample container types;
- Analysis to be performed;
- Well construction details;
- Weather conditions;
- Hand sketches of subject area(s); and
- Description and date of any photograph(s) taken.

7.0 Decontamination

If cross contamination of sampled wells is a potential problem, the following procedure should be followed:

1. Decontamination equipment according to RMC SOP 6.
2. Design sampling to proceed from best quality water to the poorest quality water.
3. If a pump is used rinse the pumping apparatus if well yields are too low to allow sufficient water to purge the pump.
4. Use one disposable bailer for both purging and sampling per well.

8.0 Demobilization

After Decontamination, sample equipment will be stored in the appropriate, clean containers. Any equipment that suffers damage or excessive wear while conducting sampling will be labeled and reported to the equipment manager for the necessary maintenance, repair and/or replacement.

SOP 4
STANDARD PROCEDURES FOR COLLECTION OF WETLAND AND STREAM SEDIMENT SAMPLES

1.0 Purpose

This SOP describes the procedures that will be used for sampling stream sediment to a maximum of 18 inches below surface. Samples will be collected with a Decontaminated shovel, stainless steel spoon or hand auger/probe. Specific soil sampling locations will be determined from the project work plan.

2.0 Sampling Equipment:

- Log forms / Field notebook / Chain of Custody Forms (COC) – Documentation of sample activities, field notes and sample custody.
- Hand Auger/Probe (if necessary) – for the collection of at-depth samples.
- Shovels – for the collection of near-surface samples.
- Log forms / Field notebook / COC – for field documentation.
- Sample containers – for sample storage and transportation.
- Stainless steel mixing bowl – for mixing composite samples.
- Stainless steel sample spoons – for the collection of surface samples and mixing composite samples.
- Disposable sampling gloves – to prevent exposure to soils and water and the prevention of cross-contamination.
- Custody seals – seals to be placed on sample containers to maintain sample integrity.

3.0 Decontamination Equipment:

- 5 gallon buckets – For washing and the collection of rinsate.
- Alconox - Soap
- Scrub brushes – For cleaning sampling equipment.
- Distilled water – For final equipment rinse.
- Culinary tap water – for equipment rinse.
- Garbage bags – for clean equipment storage.

4.0 PROCEDURE

4.1 Discrete Samples

If water samples are being concurrently sampled with stream sediment samples the water samples will be collected prior to the collection of the sediment samples. Sediment samples will be collected from streambeds with standing water or slow flow rates such that there will be no significant impact while sampling. Vegetation, rocks, and/or debris will be scraped away from the sample location with a shovel or stainless steel spoon. The underlying sediment will then be collected and placed into sample containers with a stainless steel spoon or gloved hand. Composite samples will be homogenized as described below. Coarse grained soils, gravel and rock fragments will be removed wherever possible.

4.2 Composite Samples

Composite samples will be collected (as described above) by placing sub samples into a stainless steel mixing bowl or a clean plastic bag, or by hand with new, clean sampling gloves. The sample will be homogenized with a stainless steel spoon or gloved hand. The homogenized soil will be packaged in a laboratory-supplied sample container, labeled and placed in a cooler to maintain temperature.

5.0 Labeling

Each soil sample will be labeled with the following information:

- Sample identification;
- Project number/name;
- Analyses requested;
- Date/time collected; and
- Samplers initials.

6.0 Documentation

Field activities shall be recorded in a hard bound field notebook. Field notes shall include all pertinent information including but not limited to:

- Date and time samples were collected;
- Physical description of sample area;
- Lithologic descriptions of soils encountered;
- Identification of samples collected;
- Total number of samples collected per sampling event;
- Total number of samples collected from each sample location;
- Physical description of samples;
- Preservatives used for samples;
- Sample container types;
- Analysis to be performed;
- Well construction details;
- Weather conditions;
- Hand sketches of subject area(s); and
- Description and date of any photograph(s) taken.

7.0 Demobilization

After Decontamination, sample equipment will be stored in the appropriate, clean containers. Any equipment that suffers damage or excessive wear while conducting sampling will be labeled and reported to the equipment manager for the necessary maintenance, repair and/or replacement.

SOP 5
STANDARD PROCEDURES FOR SAMPLE HANDLING, DOCUMENTATION, AND SHIPPING

1.0 Purpose

This section describes the handling and documentation procedures that will be used once soil and water samples are collected. The procedures will ensure that samples are handled properly and that appropriate documentation is completed.

2.0 Sample Handling

All samples will be promptly placed into a cooler to maintain a temperature of 4°C. Typically, samples selected for chemical analysis will be delivered at the end of each day to the analytical laboratory. If they are not submitted to the laboratory on the same day, they will be stored in a refrigerator in a locked storage room until they can be delivered to the laboratory.

3.0 Sample Identification and Labeling

Soil samples will be labeled in such a way as to identify the area and depth from which they were taken. Water samples will be labeled as to identify when and where they were collected from. Duplicate samples will always be labeled in the same manner such that the laboratory cannot tell they are duplicate (i.e., as a "blind duplicate"). Each sample container will be immediately labeled with the following information:

- Project name
- Project number
- Sample identification
- Date and time collected
- Analysis requested
- Filtered or unfiltered (water)
- Samplers initials
- Preservative used (water)

This information will also be recorded in the field logbook.

5.0 Custody Seals

Custody seals shall be used to prevent tampering and to maintain sample integrity. A seal shall be placed across the top of sample jars or across the seals of plastic sample bags. The seal shall be signed and dated by the sampler who collected the sampler.

6.0 Chain-of-Custody (COC)

COC documentation will begin in the field for each sample submitted to the laboratory and will also be maintained by laboratory personnel. Samples that are submitted to AEC will use the COC provided by AEC. A COC for each sampling event will be completed and will accompany each sample batch to the analytical laboratory. Sample custody means that all samples will remain in the possession or observation of the sampler at all times, or in a locked facility until delivery to the analytical laboratory. A sample COC form is provided in Appendix D. Copies of the COC forms shall be stored in a three ring binder for sample tracking.

7.0 Field Book

RMC field personnel will maintain a field logbook to record all field activities. The field logbook will be a weather-resistant bound field book. All data generated during the project and any accompanying comments will be entered directly into the logbook in indelible ink; any corrections will be made with single line-out deletions. At no time will any pages be removed from the field logbook.

Each day's field activities will be documented, including the following minimum information:

- Date of field activity;
- Time of field activity;
- RMC field personnel's initials;
- Project name;
- Project number;
- Date and time samples were collected;
- Physical description of sample area;
- Identification of samples collected;
- Total number of samples collected per sampling event;
- Total number of samples collected from each sample location;
- Physical description of samples;
- Preservatives used for samples;
- Sample container types;
- Filtered vs. Unfiltered samples (water);
- Analysis to be performed;
- Weather conditions;
- Hand sketches of subject area(s); and
- Description and date of any photograph(s) taken.

8.0 RMC Sample Logbook

RMC will maintain a sample logbook, which will track all samples collected and/or accepted by RMC. The logbook will provide a unique, six digit alphanumeric identifier that will be assigned to each sample collected. All samples collected will be assigned an identifier number, regardless of that samples' submission to a laboratory. The next available chronological number in the sample logbook will determine the identifier, and this number will be cross-referenced with a sample description number, assigned in the field.

The RMC Sample logbook will be a covered, bound journal with non-removable pages. At no time will any pages be removed from the sample logbook.
All entries into the sample logbook will be made in indelible ink; and all corrections shall consist of initialed, line-out deletion. Data contained therein will include:

- Unique identifier number;
- Date;
- Project number;
- Sample description number;
- Sampler initials; and Lab acceptance initials.

SOP 6
STANDARD PROCEDURES FOR SAMPLING EQUIPMENT DECONTAMINATION

1.0 Purpose

This SOP details the Decontamination protocols for sampling equipment. In order to reduce the risk of transferring materials from one sample site to another, and to assure that there is no cross-contamination of samples, the following procedures will be used.

2.0 Decontamination Equipment:

- 5 gallon buckets – For washing and the collection of rinsate.
- Alconox - Soap
- Scrub brushes – For cleaning sampling equipment.
- Distilled water – For final equipment rinse.
- Culinary tap water – for equipment rinse.
- Garbage bags – for clean equipment storage.

3.0 DECONTAMINATION PROCEDURES:

RMC uses the following Decontamination procedure for equipment:

3.1 Gross contaminant removal

This step involves scrubbing the equipment using an Alconox and water solution and a stiff scrub brush. The scrubbing will continue until all visible contaminants are removed from the equipment. This water will be changed as necessary. The Alconox and water solution is typically prepared and stored in a clean 5-gallon bucket.

3.2 Clean detergent wash

This step involves using a clean volume of Alconox and water solution. Equipment will be washed in this solution once all gross contaminants have been removed during Step 1. This solution will also be changed as necessary. The Alconox and water solution is typically prepared and stored in a clean 5-gallon bucket.

3.3 Clear water rinse

This step involves rinsing the equipment in clear, culinary tap water. This water will be changed as necessary to maintain its purity. The water solution is typically collected and stored in a clean 5-gallon bucket.

3.4 Distilled water rinse

Distilled water will be used as a final rinse for all Decontamination procedures. The water will be poured from a new container, or sprayed from a suitable container or the equipment will be submerged in a suitable container. Decontamination (equipment) blanks will be collected as required in the Sampling and Analysis Plan. The water solution is typically collected and stored in a clean 5-gallon bucket.

3.5 Decontamination fluid disposal

Decontamination fluids shall be disposed of on-site in the tailings impoundment area.

SOP 7
STANDARD PROCEDURES FOR COLLECTION OF PARTICULATE SAMPLES

1.0 Purpose

This SOP describes the procedures that will be used for the collection of particulate samples. Portable air sampling pumps will be used to collect a known volume of air through a disposal, one time use filter.

2.0 Sampling Equipment

- Field data sheets / Field notebook / Chain of Custody Forms (COC) – Documentation of sample activities, field notes and sample custody.
- Personal air sampling pump, filter media, tubing and flow meter.

3.0 Procedure

Sample locations will be specified prior to each days sampling event. Sample pumps will be calibrated prior to use. A new filter will be attached to the pump for each sample collected. The pump and filter will be attached to personnel, equipment or stationary object for the duration of sample collection. Start and finish times and flow rates will be noted. Total volume of air collected will be calculated prior to lab submittal. Nominal sample flow rates will be approximately 2-3 liters per minute. A minimum of 100 liters of air will be collected. Sample filter cassettes will be placed in a sealed plastic bag for delivery to the laboratory.

Particulate samples will be generally collected upwind, downwind and onsite during each sample event. Upwind and down wind locations will be determined prior to sampling for each sampling event and will be dependent on current local conditions.

4.0 Labeling

Each sample cassette will be labeled with the following information:

- Sample identification;
- Pump on/off times;
- Project number/name;
- Analyses requested;
- Date/time collected; and
- Samplers initials.

5.0 Documentation

Field activities shall be recorded in a hard bound field notebook and field data sheets. Field notes shall include all pertinent information including but not limited to:

- Date and time samples were collected;
- Physical description of sample area;
- Pump on/off times;
- Identification of samples collected;
- Total number of samples collected per sampling event and each location;
- Analysis to be performed;
- Weather conditions;
- Hand sketches of subject area(s); and
- Description and date of any photograph(s) taken.

7.0 Demobilization

After completion of sampling, sample equipment will be stored in the appropriate, clean containers. Any equipment that suffers damage or excessive wear while conducting sampling will be labeled and reported to the equipment manager for the necessary maintenance, repair and/or replacement.

SOP 8
STANDARD PROCEDURES FOR XRF FIELD SCREENING

1.0 Purpose

This SOP describes the procedures that will be used for the collection of X-Ray Fluorescence Spectrometry (XRF) field screening data. This procedure outlines the use of a hand held portable XRF to collect in real time, in situ "ground shots". The methodologies outlined in this SOP are based on EPA method 6200 "Field portable X-Ray Fluorescence Spectrometry for the Determination of elemental Concentrations in Soil and Sediment".

2.0 Sampling Equipment

- Field data sheets / Field notebook / Chain of Custody Forms (COC) – Documentation of sample activities and field notes.
- Field portable XRF
- Known standard samples.

3.0 Procedure

The XRF will be operated by trained personnel in accordance with the manufacture's operating manual. Prior to use the XRF will be calibrated against known standards. The first standard to be used will be an instrument blank consisting of silicon dioxide. The instrument blank is used to verify that no contamination exists in the XRF. The second set of standards will be precision measurement standards. The precision measurement standards will consist of samples with low, medium and high known concentrations of target analytes. A minimum of two precision measurements will be conducted daily. Each precision measurement will be conducted three times in replicate to measure consistency in sample readings. The results of calibration will be noted in the field notebook.

Field screening ground shots will be collected by placing the XRF unit on a smoothed, level section of the exposed soil to be tested. If required, a disposable piece of survey lathe will be used to provide a consistent level, smooth surface for analysis. The soil will be screened for approximately one minute in each location. Five replicate measurements will be taken in each location. The XRF will be moved approximately one inch for each replicate. If required on a project specific basis, the target analyte concentration for each replicate measurement will be noted and recorded. If required on a project specific basis a pin flag with the screening results may be placed in each screening location.

This procedure will not be conducted on soils with excessive moisture contents (e.g. soils that appear wet or saturated).

4.0 Documentation

Field activities shall be recorded in a hard bound field notebook according to project specifications. Due to the large amounts of data collected only selected final screening data may be recorded. Field notes shall include all pertinent information including but not limited to:

- Date and time screening was conducted;
- Physical description of sample area;
- Soil moisture conditions;
- Analysis to be performed;
- Weather conditions;
- Hand sketches of subject area(s); and
- Description and date of any photograph(s) taken.

7.0 Demobilization

After completion of sampling, sample equipment will be stored in the appropriate, clean containers. Any equipment that suffers damage or excessive wear while conducting sampling will be labeled and reported to the equipment manager for the necessary maintenance, repair and/or replacement.

RMC SOP 9
STANDARD PROCEDURES FOR VEGETATION AND EROSION MONITORING

1.0 Purpose

This SOP describes the procedures that will be used for vegetation monitoring. The procedures will ensure that trends in vegetation change are monitored properly and that appropriate documentation is completed.

2.0 Equipment:

- Log forms / Field notebook / Chain of Custody Forms (COC) – for documentation of sample activities, field notes and sample custody.
- Heavy pin
- Pin frame / Sighting frame – for dropping the pin at 10.0-cm intervals.
- Measuring tape (25.0-m or greater) – for measuring transect length and pin-drop spacing.
- Wooden stakes – for marking beginning and end of transects.
- Sample containers – for sample storage and transportation.
- Digital camera – for photo documentation at photo points.
- 0.5-m X 1.0-m frame – for sample collection.
- Scissors – for clipping vegetation.

3.0 Procedure:

Vegetative monitoring will include both permanent and non-permanent transects which will be used for measuring upland herbaceous vegetation. The point intercept or pin-drop method will be used for both permanent and non-permanent transects. This method is highly repeatable and measures cover. The difference is the non-permanent transects will also include production measurements to determine future stocking rates.

The point intercept or pin-drop consists of dropping a pin every 10.0-cm along a 25.0-m belt transects. This will be accomplished by either a pin-frame, sighting frame or manually. This method measures cover for individual species, total cover and species composition by cover. Basal cover is measured because it is the most stable for herbaceous communities due to the fact that it does not vary as much due to climatic fluctuations or current year grazing.

For permanent transects, a baseline is established by stretching a measuring tape between two permanent stakes. This baseline needs to be located within a single plant community within a single ecological site, or in this case a seeded graminoid type. Up-close digital photographs of each transect should be taken looking towards the 25.0-m end, as well as a point along the transect that is determined in the field and documented in the field notes. The photograph will document soil surface characteristics and the amount of ground surface covered by vegetation. The photo points will be taken at roughly the same time of year to assist in interpreting changes in vegetation. A paired t test can be used in the data analysis to measure significant change in average cover between two sampling points.

For non-permanent transects, transects and methods are the same as permanent transects (see above) however, the site location is determined randomly. Like the permanent transects, these sites need to found within the same single plant community within a single ecological type. Unlike the permanent transects these transects will change year to year. After collecting cover data, a 0.5-m X 1.0-m frame is placed lengthwise at the 5.0-m and 15.0-m points on the right side of the outstretched tape. Then all perennial herbaceous vegetation that falls within the frame (it doesn't have to be rooted) is identified, clipped and bagged individually by species. These samples can then be sent to a lab to be oven-dried at 60°C for 24 hrs to determine air-dry weight and then converted to pounds of forage/acre. Because this technique involves destructive sampling (clipped plots) permanent transects are not recommended.

4.0 Riparian Areas:

This design may need to be modified for riparian areas where the area that needs to be sampled is long and narrow. For riparian areas, a Level III survey or Proper Functioning Condition (PFC) assessment will be conducted. Digital photographs should supplement quantitative data monitoring methods. Photographs at least provide a baseline inventory of the landscape and documentation on rates of vegetation change and events associated with that particular change.

5.0 Erosion-Prone Areas:

This design may need to be modified for areas experiencing excessive erosion or prone to excessive erosion. Additional transects and photo points may be established in eroding/erosion prone-areas and measurements/photos may be taken at more frequent intervals than normal to more closely monitor change. Also, erosion control measures and/or Best Management Practices (BMPs) may be implemented to halt and prevent further erosion.

6.0 Documentation

Field activities shall be recorded in a hardbound field notebook. Field notes shall include all pertinent information including but not limited to:

- Date and time samples were collected;
- Physical description of sample area/transect;
- Identification of samples collected;
- Total number of samples collected per sampling event;
- Total number of samples collected from each sample location;
- Physical description of samples;
- Sample container types;
- Analysis to be performed;
- Weather conditions;
- Hand sketches of subject area(s); and
- Description and date of any photograph(s) taken.

Sample handling and Chain of Custody documentation shall be in accordance with RMC SOP 5 found in this document.

7.0 Demobilization

After Decontamination, sample equipment will be stored in the appropriate, clean containers. Any equipment that suffers damage or excessive wear while conducting sampling will be labeled and reported to the equipment manager for the necessary maintenance, repair and/or replacement.

APPENDIX B

AWAL QA/QC MANUAL
(Available upon request)

Appendix C

APPENDIX C

Custom Upland Seed Mix

Slender wheatgrass	*Agropyron trachycaulum*	15%
Nevada bluegrass*	*Poa nevadensis*	10%
Squirreltail	*Sitanion hystrix*	9%
Bluebunch wheatgrass	*Agropyron spicatum*	20%
Western wheatgrass	*Agropyron smithii*	10%
Thickspike wheatgrass	*Agropyron dasystachyum*	10%
Mountain (California) brome	*Bromus carinatus*	15%
Sterile wheat (Quick-guard)	*Triticum X Secale*	10%
Yarrow	*Achillea millifolium*	0.25%
Blue flax	*Linum perenne*	0.5%
Silver lupine	*Lupinus argenteus* var. *argenteus*	0.25%

*Sandberg bluegrass (*Poa sandbergii)* may be substituted if Nevada bluegrass is not available.

Custom Wetland Seed Mix

Water sedge	*Carex aquatilis*	**
Beaked sedge	*Carex rostrata*	**
Nebraska sedge	*Carex nebrascensis*	**
Baltic rush	*Juncus balticus*	**
Reed canary-grass	*Phalaris arundinacea*	**
Northern reed-grass*	*Calamagrostis neglecta*	**
Tufted hairgrass	*Deschampsia caespitosa*	**
Blue wildrye	*Elymus glauca*	**

*Blue-joint reed-grass (*Calamagrostis canadensis*) may be substituted for Northern reed-grass.
** Percentages are determined by availability of seed for that season.

Appendix D

APPENDIX D

Applied Geotechnical Engineering Consultants, Inc.

October 4, 2001

United Park City Mines Company
PO Box 1450
Park City, UT 84060

Attention: Kerry Gee
Fax (435) 649-8035

Subject: Stability Evaluation
Richardson Flat Tailings Embankment
Near Park City, Utah
Project No. 1010603

Gentlemen:

Applied Geotechnical Engineering Consultants, Inc. was requested to perform a stability evaluation for the Richardson Flat tailings embankment located near Park City, Utah (see Figure 1). The study was performed to estimate the increase in stability of the embankment once a buttress fill was placed along the toe of the embankment. Our study included a review of geotechnical and hydrogeologic studies which were previously performed at the site by others and a reconnaissance of the site. No subsurface investigation was performed for this study.

HISTORY

We understand that the Richardson Flat area was first used for a tailings pond during 1953 with enlargements of the tailings pond area through construction of containment dikes and embankments during the 1970's.

In 1974, Dames and Moore performed a geotechnical investigation to provide recommendations for construction of embankments and dikes for the tailings pond and provided specific recommendations for construction of the enlarged embankment. Subsequent study was performed in 1980 to evaluate the construction which occurred. Results of that study indicate that construction which occurred in 1974 did not fully meet the recommendations provided. The Dames and Moore report indicates that "while the most objectionable foundation materials appear to have been largely removed, stripping was inadequate in places, side slopes were locally oversteepened, internal zoning was not as recommended and compaction was poor overall." Our understanding is that the embankment has remained generally in the condition as described in 1980 by Dames and Moore and has shown no evidence of stability problems.

SITE CONDITIONS

The main embankment under present conditions, extends approximately 400 feet in length in a general east/west direction and reaches a maximum height of approximately 26 feet near the east end of the embankment. The slope of the exterior of the embankment varies considerably, particularly on the west end. The steepest embankment slopes are generally along the east end where the exterior slope of the embankment is at a slope of approximately 1.5 horizontal to 1 vertical.

The interior of the tailings pond has been filled with tailings to near the top of the main embankment and has a gentle slope down toward the south. The ground surface is also relatively flat north of the main embankment with a very gently slope down toward the northeast.

Vegetation in the interior of the pond consists of grass, brush and weeds. Vegetation near the toe of the slope is relatively dense consisting predominantly of grass, brush and small trees. Vegetation along the exterior slope of the main embankment consists of grass and brush.

There is evidence of seepage near the toe of the embankment based on the vegetation type in this area.

SUBSURFACE CONDITIONS

The assumed subsurface conditions in the area of the embankment are based on 2 borings drilled by Dames and Moore and during their study reported 1974. The embankment materials encountered at that time consisted of fill in the upper approximately 22 feet, topsoil which was indicated to extend to a depth on the order of 28 feet underlain by silty sand and clay which was underlain by bedrock at a depth of approximately 32 feet in Boring B-1. Some of the fill as described contain wood, debris and other deleterious materials which we understand were mostly removed during the reconstruction and enlargement of the embankment in 1974. Natural soil obtained from the area west of the embankment was used as fill for enlargement and raising of the main embankment. We understand that this material consists predominantly of clayey sand and gravel. Placement of the additional material increased the height of the embankment by approximately 8 feet.

We understand that the subsurface water level is relatively shallow at the interior of the main embankment. There are seeps near the toe of the exterior of the main embankment.

ENGINEERING ANALYSIS

Profiles of the main embankment were developed at 2 locations based on a description of subsurface conditions available from previous studies. The locations of these 2 profiles are presented on Figure 2 and the profiles are presented on Figures 3 and 4. The assumed strengths of these materials are considered conservative with the assumed strengths indicated

on Figures 3 and 4. Rotational failure analyses were conducted on the profiles aided by a computer using the Bishop method of analysis. Print-outs of stability runs are included in the Appendix.

The stability of the embankment under its present condition using the assumed strength parameters is estimated to be slightly greater than 1. We anticipate that the stability of the embankment is greater than that calculated.

Placement of a buttress fill along the lower portion of the embankment will significantly increase the overall stability of the embankment. Flattening of the exterior of the embankment will also provide increased stability.

We estimate that there would be an approximate 50 percent increase in overall stability of the embankment if a buttress fill is placed along the lower portion of the embankment with the height of the buttress fill approximately 10 feet above the embankment toe elevation and extending horizontally out from the embankment slope face approximately 30 feet. The buttress fill would have an exterior slope of 2 horizontal to 1 vertical. A similar increase is obtained for a buttress fill which extends 15 feet above the embankment toe elevation, extends approximately 20 feet horizontally out from the face of the embankment slope and has an exterior slope of 2 horizontal to 1 vertical. Flattening of the embankment to 3 horizontal to 1 vertical by placement of a wedge of material along the exterior of the embankment would increase the overall stability approximately 50 percent.

For each of these options, we recommend that the vegetation and upper soil which contains a significant amount of organics, be removed prior to placement of the fill. Drain material should be place above the prepared subgrade to allow for interception of seepage which may be encountered in the embankment. A filter blanket may be required to prevent particle migration into the drain. The drain should be designed to allow for removal of seepage water encountered.

Buttress fill materials may consist of most any soil types exclusive of organics, topsoil, debris and other deleterious materials. The use of fine grain materials such as clays and silts, may encounter greater difficulty in obtaining adequate compaction of the fill, particularly during the cold or wet time of the year. The fill should be compacted to at least 95 percent of the maximum dry density as determined by ASTM D-698 at a moisture content within 2 percent of optimum.

The buttress fill should be protected from erosion through vegetation or other methods.

LIMITATIONS

This report has been prepared in accordance with generally accepted geotechnical engineering practices in the area for the use of the client for design purposes. The conclusions and recommendations included within the report are based on the information obtained from studies performed by others and a site reconnaissance. Variations in the subsurface

conditions may not become evident until additional exploration or excavation is conducted. If the subsurface conditions or groundwater levels are found to be significantly different from those described above, we should be notified so that we can re-evaluate our recommendations.

We appreciate the opportunity of providing this service to you. If you have any questions, or if we can be of further service, please call.

Sincerely,

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

Douglas R. Hawkes, P.E., P.G

Reviewed by JRM, P.E.
DRH/dc
enclosures

REFERENCES

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Dames & Moore, 1974, Report of Embankment and Dike Design Requirements, Proposed Tailings Pond Development, near Park City, Utah: Consultant's report prepared for Park City Ventures Corporation, March 1974.

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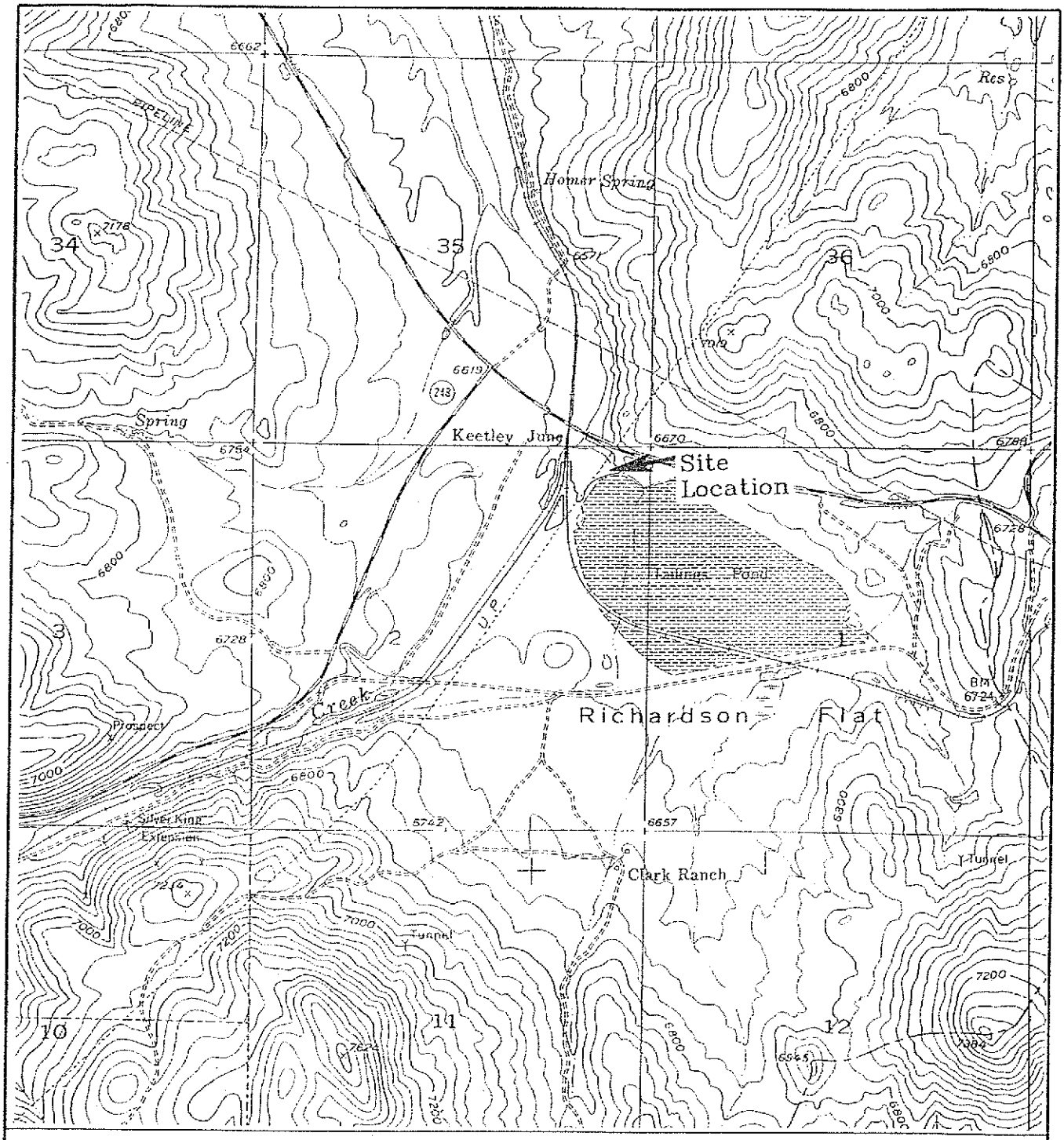
Weston Engineering, Inc., 1999, Preliminary Hydrologic Review of Richardson Flats Tailings Site, sections 1 and 2, Township 2 South, Range 4 East, Summit County, Utah: Consultant's report prepared for Le Boeuf, Lamb, Greene & Mac Rae, LLP, March 1999.



From USGS Quadrangle
Park City East, Utah

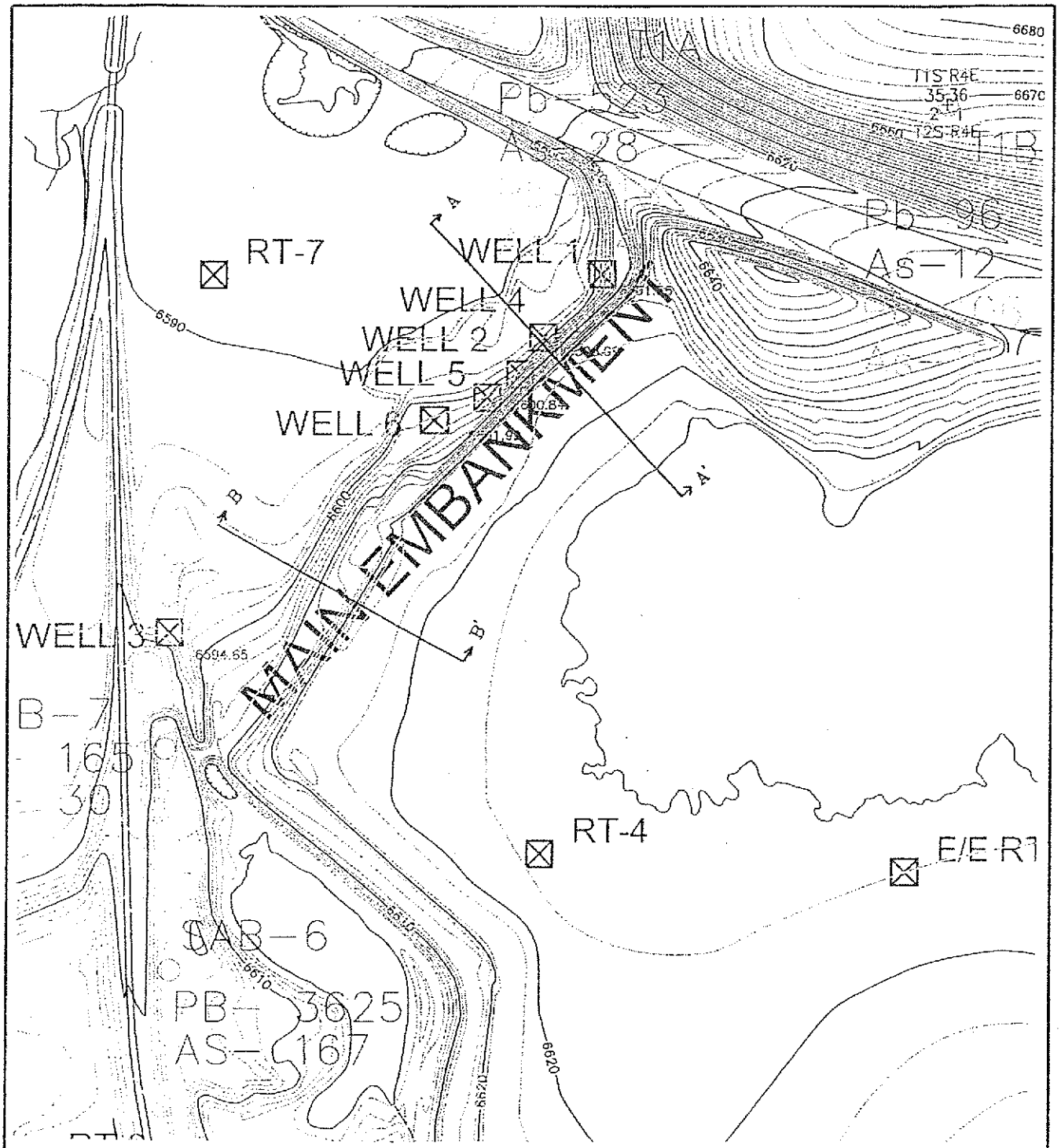
N

Approximate Scale

1" = 2,000'

STABILITY EVALUATION
RICHARDSON FLAT TAILINGS EMBANKMENT
NEAR PARK CITY, UTAH

1010603	AGRA	Location of Site	Figure 1



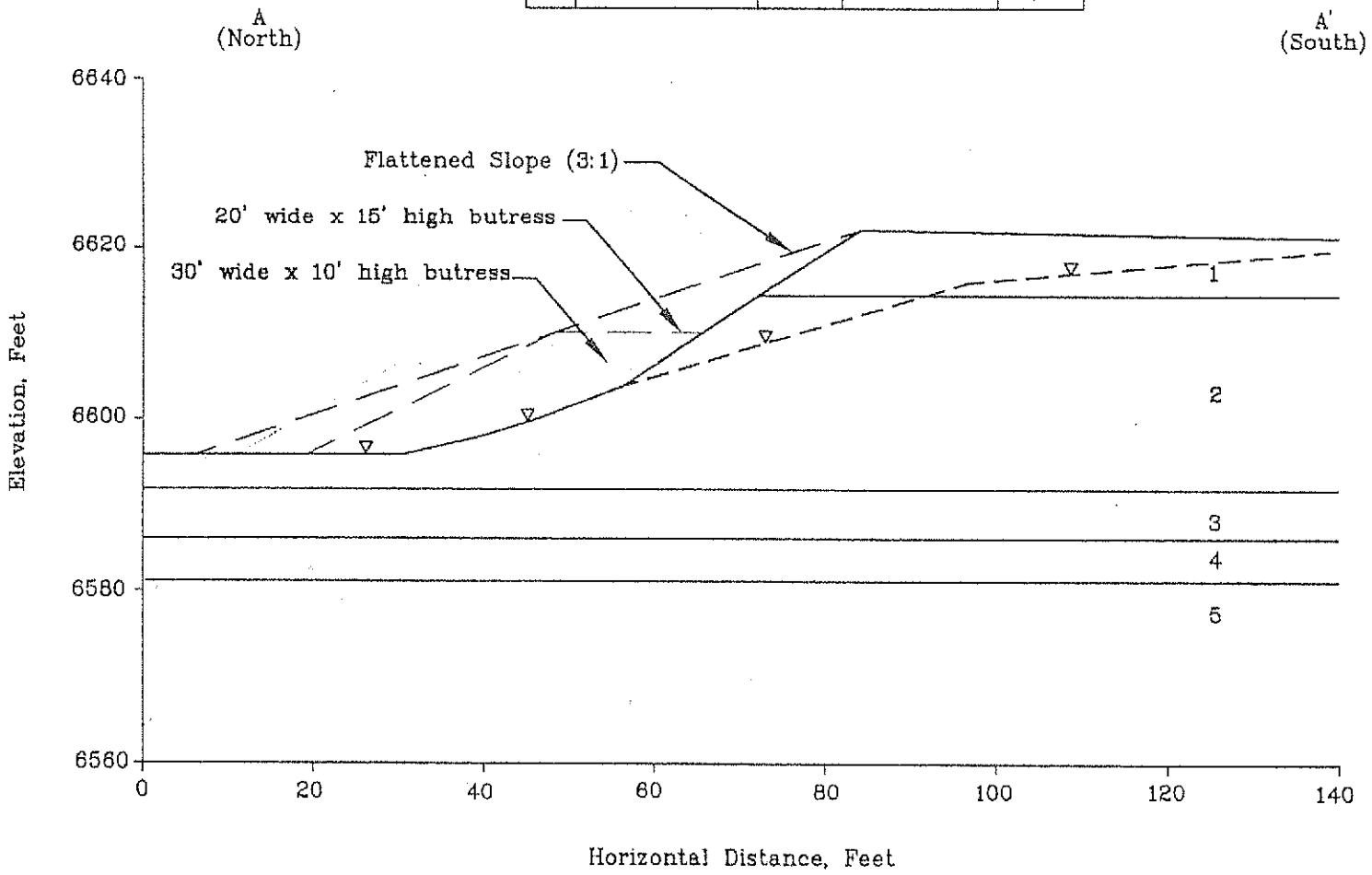
N

0 200 400 feet

Approximate Scale

STABILITY EVALUATION
RICHARDSON FLAT TAILINGS EMBANKMENT
NEAR PARK CITY, UTAH

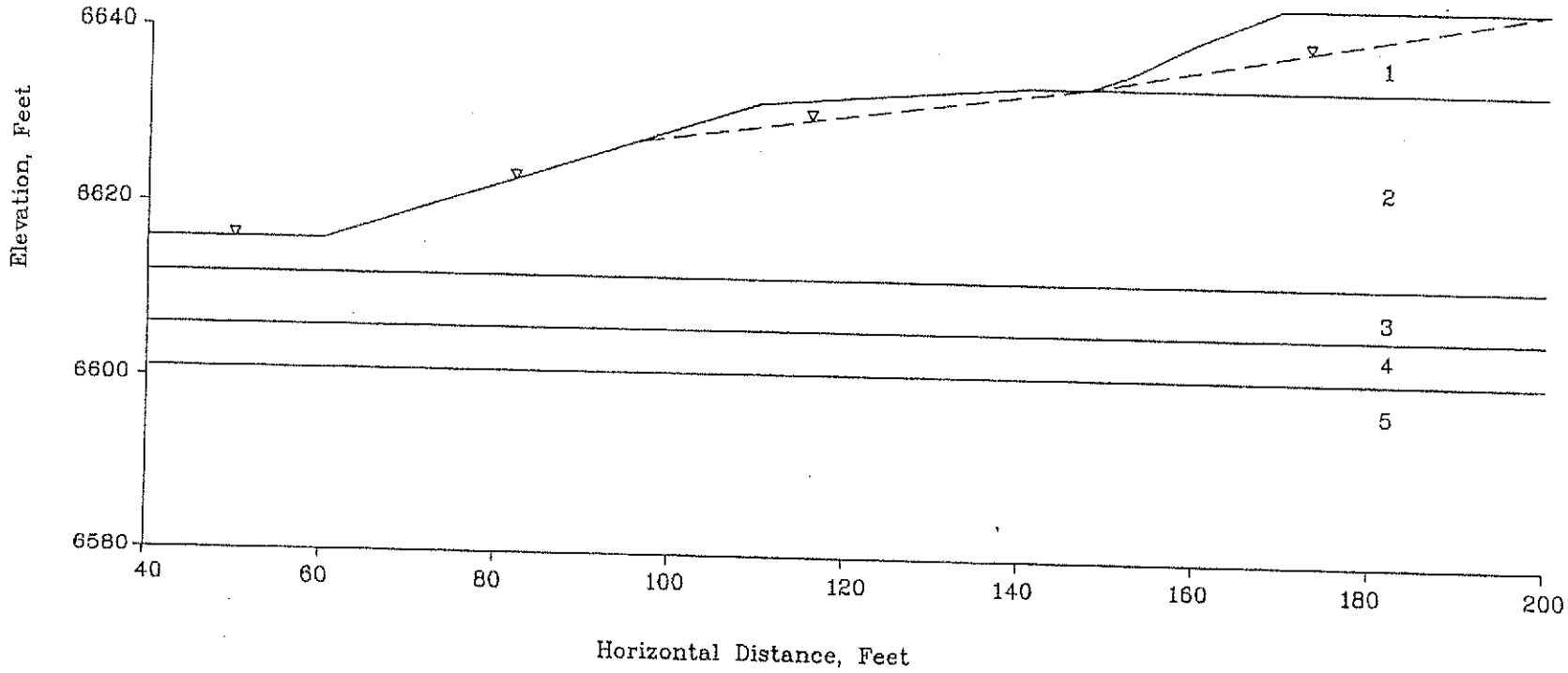
Soil/Bedrock Parameters				
Unit	Soil/Bedrock	Density pcf	Friction Angle degrees	Cohesion psf
1	Fill; Clayey Gravel	130	37	200
2	Fill; Clay	120	20	150
3	Topsoil	120	20	150
4	Silty Sand	120	36	0
5	Bedrock	140	36	5,000



Soil/Bedrock Parameters				
Unit	Soil/Bedrock	Density pcf	Friction Angle degrees	Cohesion psf
1	Fill; Clayey Gravel	130	37	200
2	Fill; Clay	120	20	150
3	Topsoil	120	20	150
4	Silty Sand	120	38	0
5	Bedrock	140	38	5,000

B
(North)

B'
(South)



AGES

Cross-Section, B–B'

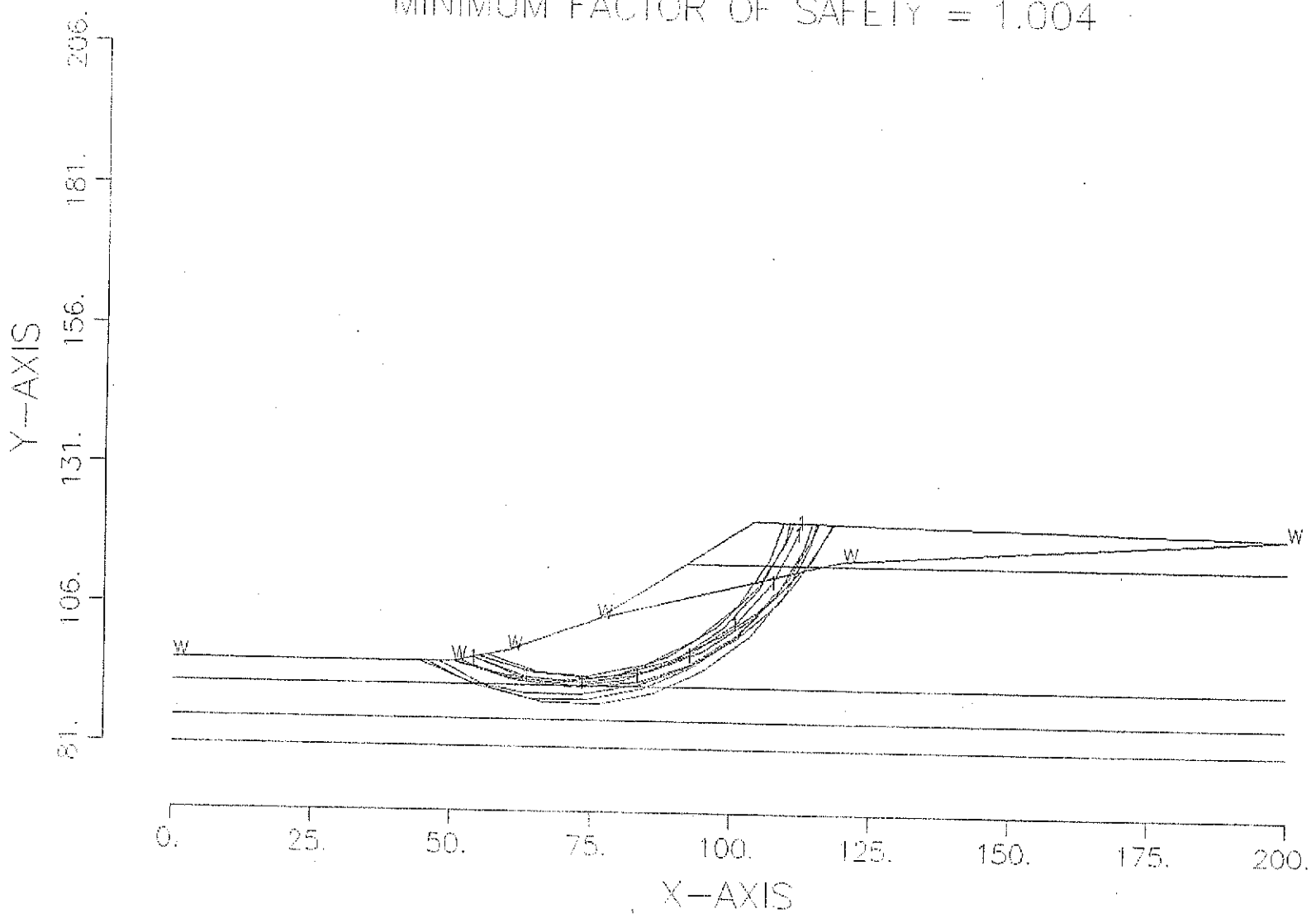
APPENDIX

SLOPE STABILITY ANALYSIS PRINTOUT

AGI
Midvale UT s/n5206

Richardson A–A'

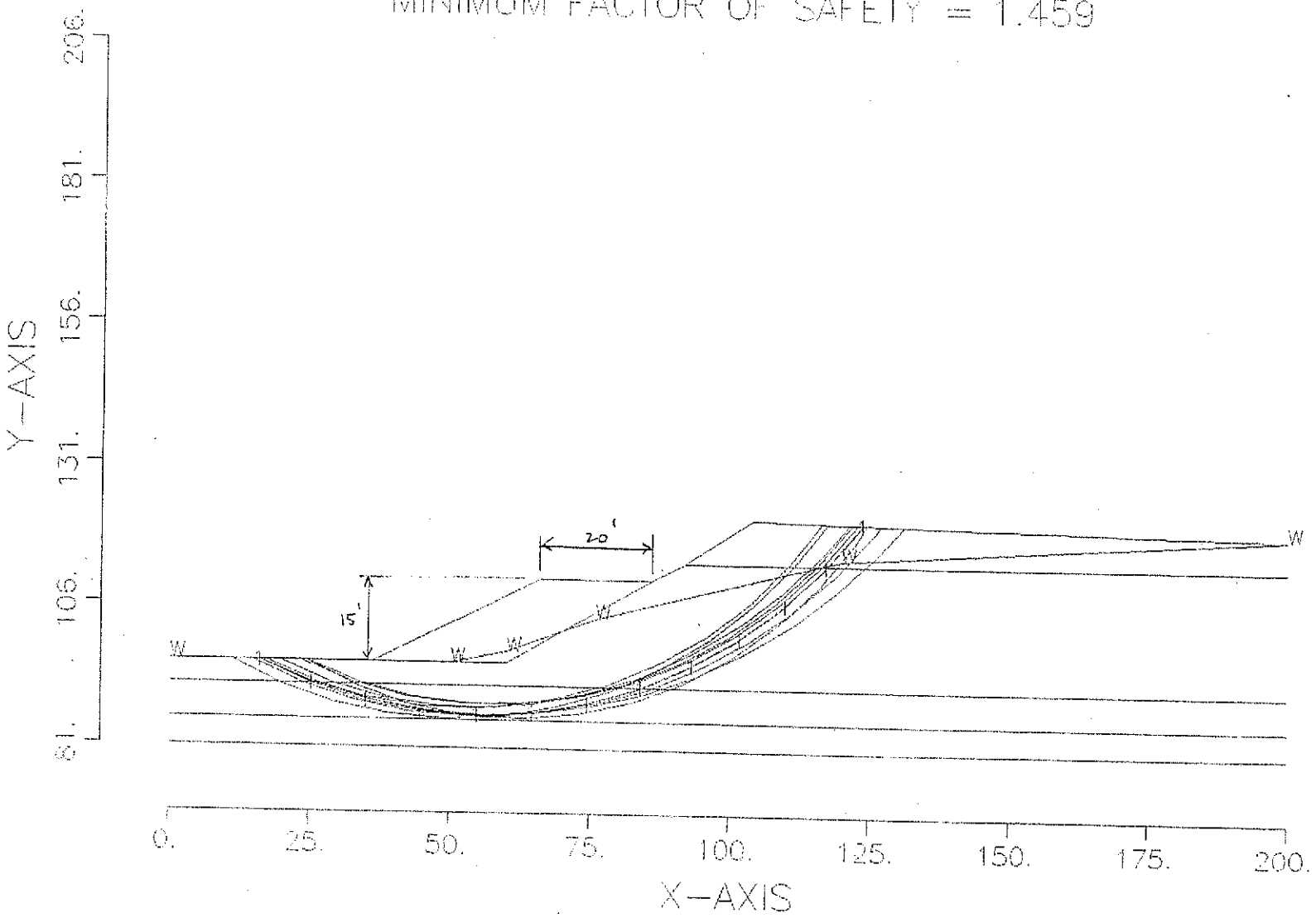
2500SURFACES HAVE BEEN GENERATED
10 MOST CRITICAL OF SURFACES GENERATED
MINIMUM FACTOR OF SAFETY = 1.004



AGE
Midvale UT s/n5206

Richardson A–A'

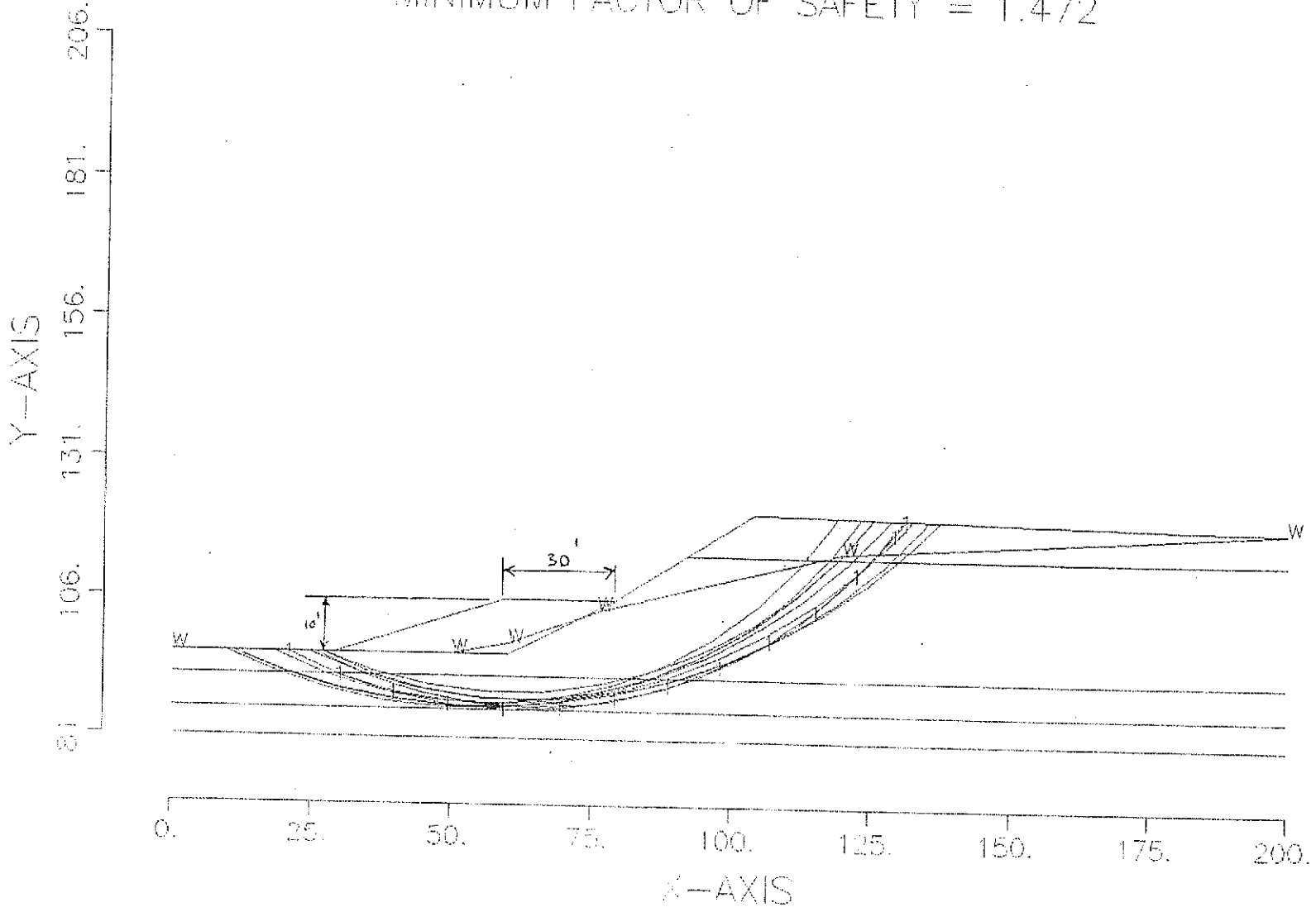
2500 SURFACES HAVE BEEN GENERATED
10 MOST CRITICAL OF SURFACES GENERATED
MINIMUM FACTOR OF SAFETY = 1.459



AGC
Midvale UT s/n5206

Richardson A–A'

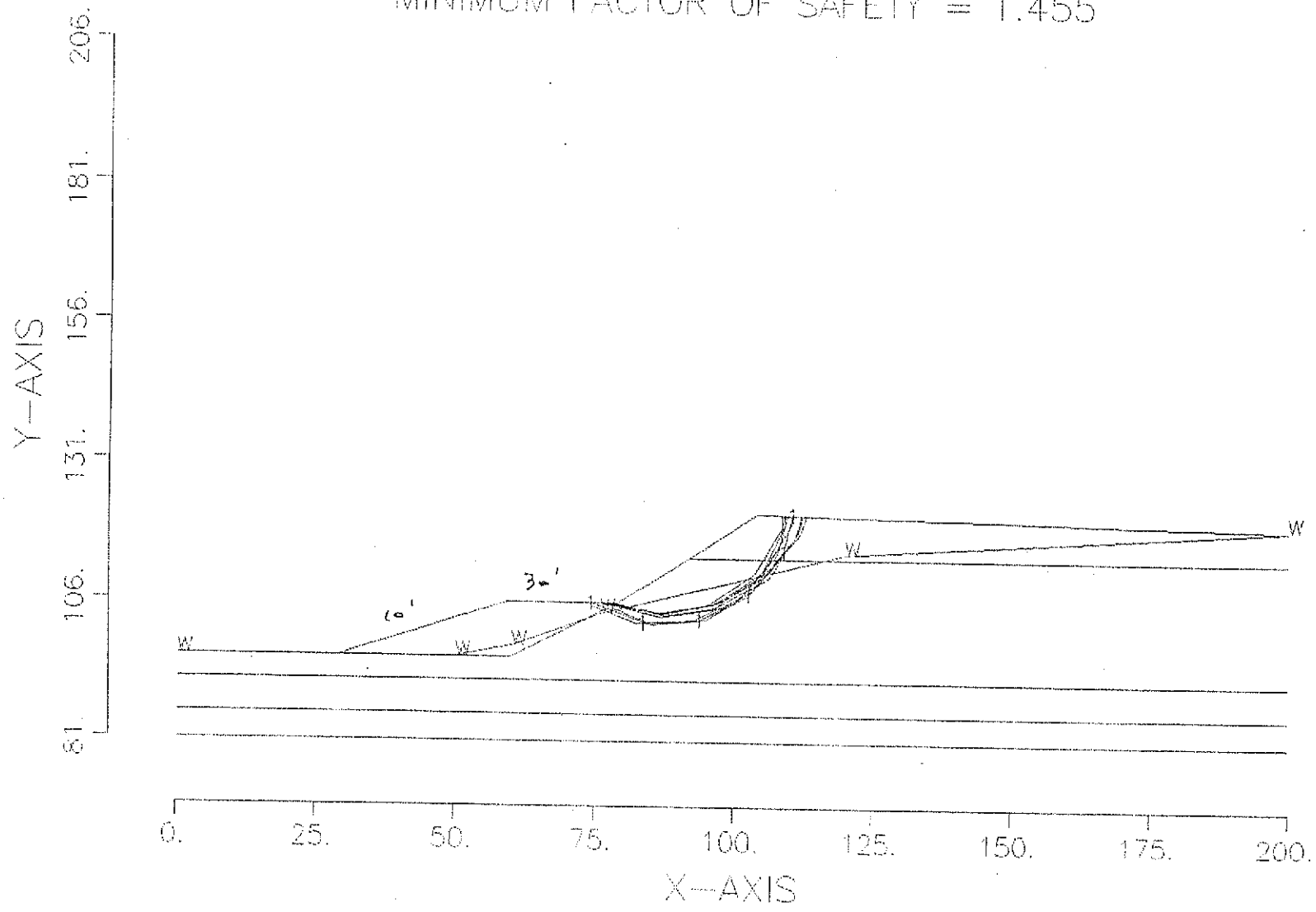
2500SURFACES HAVE BEEN GENERATED
10 MOST CRITICAL OF SURFACES GENERATED
MINIMUM FACTOR OF SAFETY = 1.472



AGI
Midvale UT s/n5206

Richardson A–A'

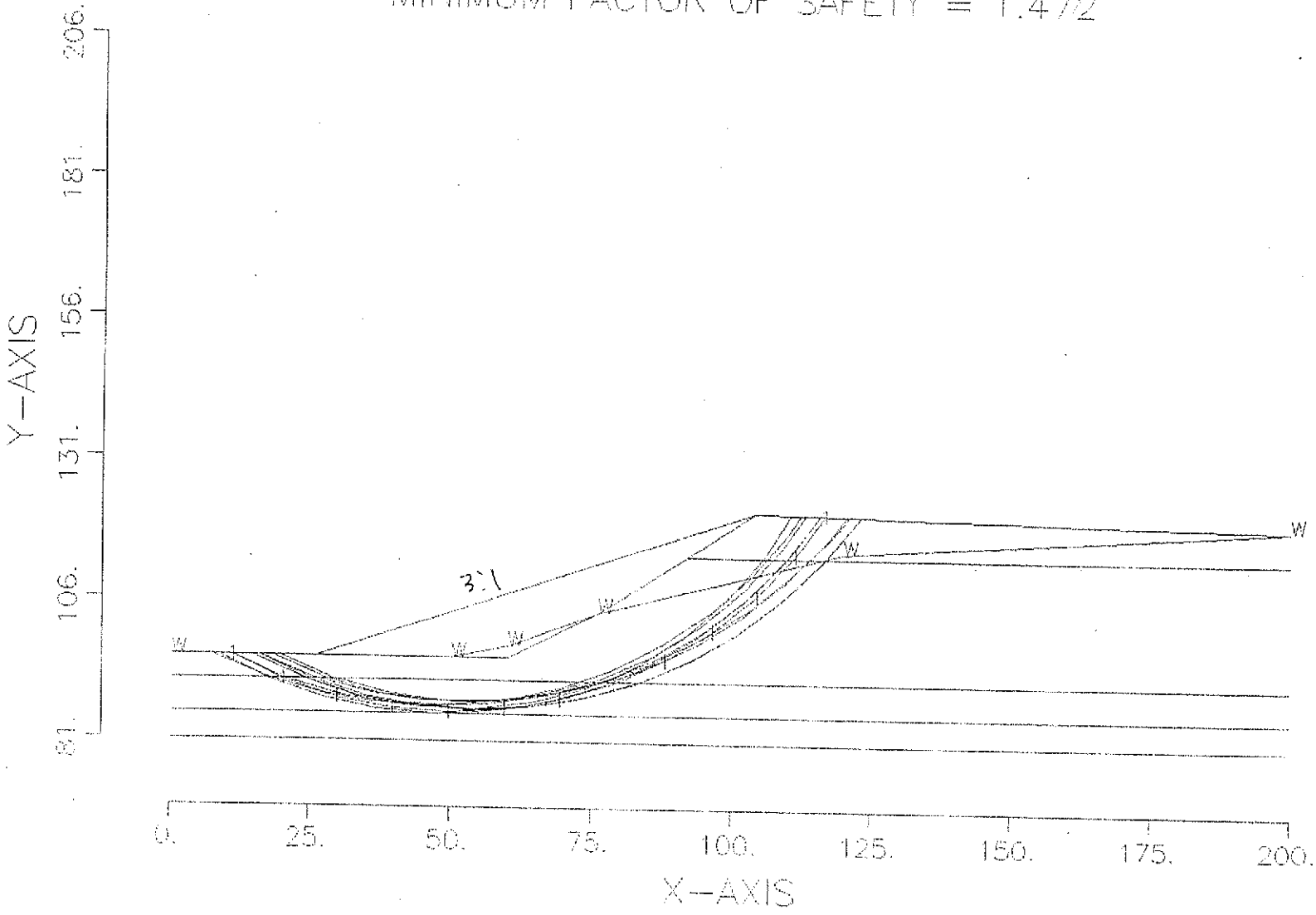
2500SURFACES HAVE BEEN GENERATED
10 MOST CRITICAL OF SURFACES GENERATED
MINIMUM FACTOR OF SAFETY = 1.455



AGE
Midvale UT s/n5206

Richardson A–A'

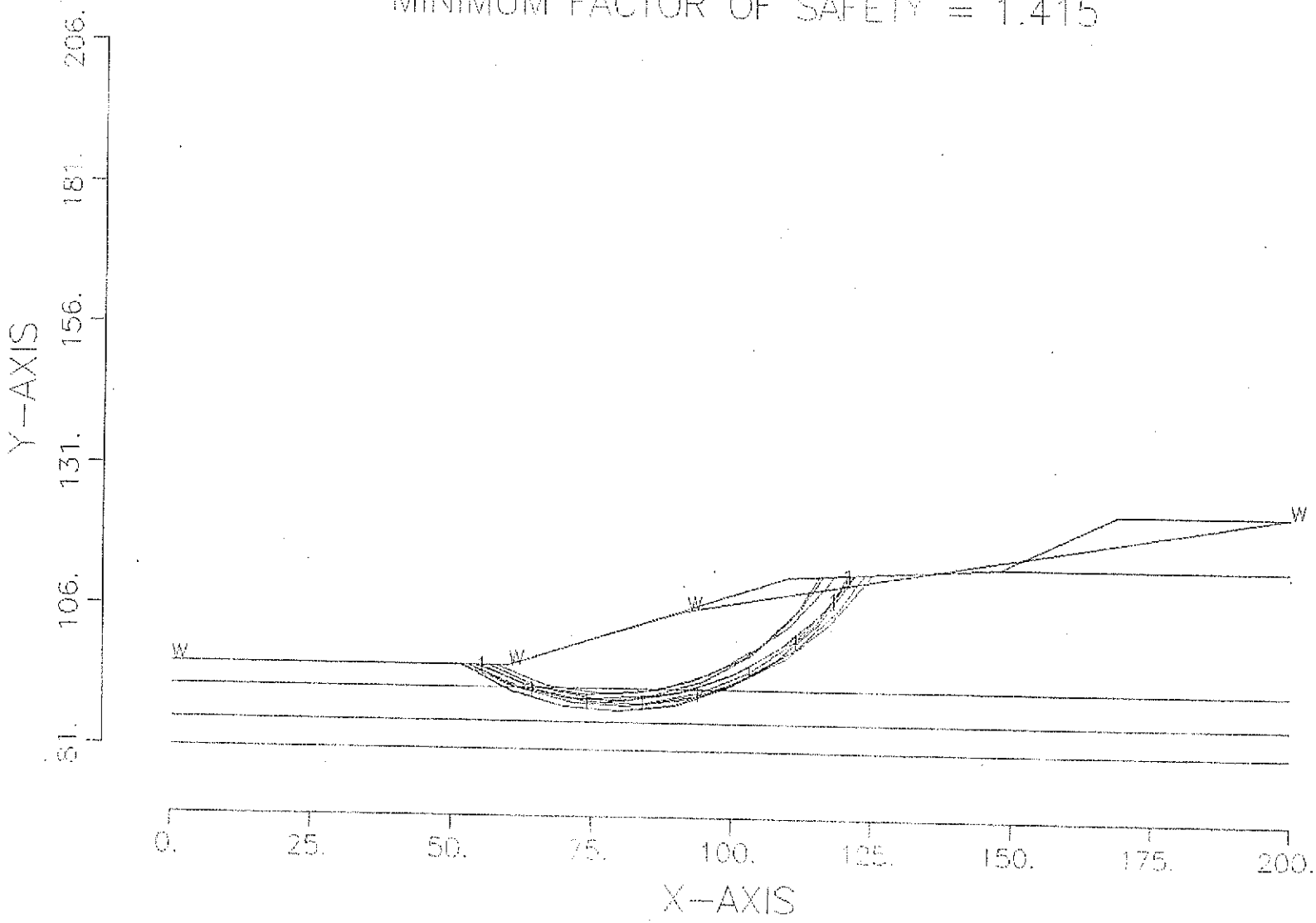
2500 SURFACES HAVE BEEN GENERATED
10 MOST CRITICAL OF SURFACES GENERATED
MINIMUM FACTOR OF SAFETY = 1.472



AGE
Midvale UT s/n5206

Richardson B–B'

2500 SURFACES HAVE BEEN GENERATED
10 MOST CRITICAL OF SURFACES GENERATED
MINIMUM FACTOR OF SAFETY = 1.415



--SLOPE STABILITY ANALYSIS--
SIMPLIFIED JANBU METHOD OF SLICES
IRREGULAR FAILURE SURFACES

PROBLEM DESCRIPTION Richardson A-A'

BOUNDARY COORDINATES

6 TOP BOUNDARIES
10 TOTAL BOUNDARIES

BOUNDARY NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SOIL TYPE BELOW BND
1	.00	96.00	50.00	96.00	2
2	50.00	96.00	60.00	98.00	2
3	60.00	98.00	76.00	104.00	2
4	76.00	104.00	92.00	114.00	2
5	92.00	114.00	104.00	122.00	1
6	104.00	122.00	200.00	120.00	1
7	92.00	114.00	200.00	114.00	2
8	.00	92.00	200.00	92.00	3
9	.00	86.00	200.00	86.00	4
10	.00	81.00	200.00	81.00	5

ISOTROPIC SOIL PARAMETERS

5 TYPE(S) OF SOIL

SOIL TYPE NO.	TOTAL UNIT WT.	SATURATED UNIT WT.	COHESION INTERCEPT	FRICTION ANGLE (DEG)	PORE PRESSURE PARAMETER	PRESSURE CONSTANT	PIEZOMETRIC SURFACE NO.
1	130.0	130.0	200.0	37.0	.00	.0	1
2	120.0	120.0	150.0	20.0	.00	.0	1
3	120.0	120.0	150.0	20.0	.00	.0	1
4	120.0	120.0	.0	36.0	.00	.0	1
5	140.0	140.0	5000.0	36.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

UNITWEIGHT OF WATER = 62.40

PIEZOMETRIC SURFACE NO. 1 SPECIFIED BY 6 COORDINATE POINTS

POINT NO.	X-WATER	Y-WATER
1	.00	96.00
2	50.00	96.00
3	60.00	98.00
4	76.00	104.00
5	120.00	115.00
6	200.00	120.00

A CRITICAL FAILURE SURFACE SEARCHING METHOD, USING A RANDOM
TECHNIQUE FOR GENERATING CIRCULAR SURFACES, HAS BEEN SPECIFIED.

2500 TRIAL SURFACES HAVE BEEN GENERATED.

50 SURFACES INITIATE FROM EACH OF 50 POINTS EQUALLY SPACED
ALONG THE GROUND SURFACE BETWEEN X = .00
AND X = 60.00

EACH SURFACE TERMINATES BETWEEN X = 100.00
AND X = 200.00

UNLESS FURTHER LIMITATIONS WERE IMPOSED, THE MINIMUM ELEVATION
AT WHICH A SURFACE EXTENDS IS Y = .00

10.00 FT. LINE SEGMENTS DEFINE EACH TRIAL FAILURE SURFACE.

FOLLOWING ARE DISPLAYED THE TEN MOST CRITICAL OF THE TRIAL
FAILURE SURFACES EXAMINED. THEY ARE ORDERED - MOST CRITICAL
FIRST.

SAFETY FACTORS ARE CALCULATED BY THE MODIFIED BISHOP METHOD.

1
AGEC
Midvale UT s/n5206

FAILURE SURFACE # 1 SPECIFIED BY 9 COORDINATE POINTS

SAFETY FACTOR = 1.004

X-CENTER = 72.27
Y-CENTER = 135.27
RADIUS = 42.66

POINT NO.	X-SURF	Y-SURF	ALPHA (DEG)
1	53.88	96.78	-18.81
2	63.34	93.55	-5.35
3	73.30	92.62	8.11
4	83.20	94.03	21.58
5	92.50	97.71	35.04
6	100.69	103.45	48.50
7	107.31	110.94	61.96
8	112.02	119.77	75.42
9	112.55	121.82	

--SLOPE STABILITY ANALYSIS--
SIMPLIFIED JANBU METHOD OF SLICES
IRREGULAR FAILURE SURFACES

PROBLEM DESCRIPTION Richardson A-A' - 20' X 15' Buttress

BOUNDARY COORDINATES

6 TOP BOUNDARIES
12 TOTAL BOUNDARIES

BOUNDARY NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SOIL TYPE BELOW BND
1	.00	96.00	36.00	96.00	2
2	36.00	96.00	66.00	111.00	6
3	66.00	111.00	86.00	111.00	6
4	86.00	111.00	92.00	114.00	2
5	92.00	114.00	104.00	122.00	1
6	104.00	122.00	200.00	120.00	1
7	92.00	114.00	200.00	114.00	2
8	36.00	96.00	60.00	96.00	2
9	60.00	96.00	86.00	111.00	2
10	.00	92.00	200.00	92.00	3
11	.00	86.00	200.00	86.00	4
12	.00	81.00	200.00	81.00	5

ISOTROPIC SOIL PARAMETERS
6 TYPE(S) OF SOIL

SOIL TYPE NO.	TOTAL UNIT WT.	SATURATED UNIT WT.	COHESION INTERCEPT	FRICTION ANGLE (DEG)	PORE PRESSURE PARAMETER	PRESSURE CONSTANT	PIEZOMETRIC SURFACE NO.
1	130.0	130.0	200.0	37.0	.00	.0	1
2	120.0	120.0	150.0	20.0	.00	.0	1
3	120.0	120.0	150.0	20.0	.00	.0	1
4	120.0	120.0	.0	36.0	.00	.0	1
5	140.0	140.0	5000.0	36.0	.00	.0	1
6	130.0	130.0	200.0	37.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

UNITWEIGHT OF WATER = 62.40

PIEZOMETRIC SURFACE NO. 1 SPECIFIED BY 6 COORDINATE POINTS

POINT NO.	X-WATER	Y-WATER
1	.00	96.00
2	50.00	96.00
3	60.00	98.00
4	76.00	104.00
5	120.00	115.00
6	200.00	120.00

A CRITICAL FAILURE SURFACE SEARCHING METHOD, USING A RANDOM
TECHNIQUE FOR GENERATING CIRCULAR SURFACES, HAS BEEN SPECIFIED.

2500 TRIAL SURFACES HAVE BEEN GENERATED.

50 SURFACES INITIATE FROM EACH OF 50 POINTS EQUALLY SPACED
ALONG THE GROUND SURFACE BETWEEN X = .00

AND X = 60.00

EACH SURFACE TERMINATES BETWEEN X = 100.00
AND X = 200.00

UNLESS FURTHER LIMITATIONS WERE IMPOSED, THE MINIMUM ELEVATION
AT WHICH A SURFACE EXTENDS IS Y = .00

10.00 FT. LINE SEGMENTS DEFINE EACH TRIAL FAILURE SURFACE.

FOLLOWING ARE DISPLAYED THE TEN MOST CRITICAL OF THE TRIAL
FAILURE SURFACES EXAMINED. THEY ARE ORDERED - MOST CRITICAL
FIRST.

SAFETY FACTORS ARE CALCULATED BY THE MODIFIED BISHOP METHOD.

1
AGEC
Midvale UT s/n5206

FAILURE SURFACE # 1 SPECIFIED BY 14 COORDINATE POINTS

SAFETY FACTOR = 1.459

X-CENTER = 54.68
Y-CENTER = 172.87
RADIUS = 86.09

POINT NO.	X-SURF	Y-SURF	ALPHA (DEG)
1	15.92	96.00	-23.43
2	25.09	92.02	-16.77
3	34.67	89.14	-10.11
4	44.51	87.38	-3.46
5	54.50	86.78	3.20
6	64.48	87.34	9.86
7	74.33	89.05	16.52
8	83.92	91.89	23.18
9	93.11	95.83	29.84
10	101.79	100.81	36.50
11	109.83	106.75	43.16
12	117.12	113.59	49.81
13	123.57	121.23	56.47
14	123.81	121.59	

--SLOPE STABILITY ANALYSIS--
SIMPLIFIED JANBU METHOD OF SLICES
IRREGULAR FAILURE SURFACES

PROBLEM DESCRIPTION Richardson A-A' - 30' X 10' Buttress

BOUNDARY COORDINATES

6 TOP BOUNDARIES
12 TOTAL BOUNDARIES

BOUNDARY NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SOIL TYPE BELOW BND
1	.00	96.00	29.00	96.00	2
2	29.00	96.00	59.00	106.00	6
3	59.00	106.00	79.00	106.00	6
4	79.00	106.00	92.00	114.00	2
5	92.00	114.00	104.00	122.00	1
6	104.00	122.00	200.00	120.00	1
7	92.00	114.00	200.00	114.00	2
8	29.00	96.00	60.00	96.00	2
9	60.00	96.00	79.00	106.00	2
10	.00	92.00	200.00	92.00	3
11	.00	86.00	200.00	86.00	4
12	.00	81.00	200.00	81.00	5

ISOTROPIC SOIL PARAMETERS

6 TYPE(S) OF SOIL

SOIL TYPE NO.	TOTAL UNIT WT.	SATURATED UNIT WT.	COHESION INTERCEPT	FRICTION ANGLE (DEG)	PORE PRESSURE PARAMETER	PRESSURE CONSTANT	PIEZOMETRIC SURFACE NO.
1	130.0	130.0	200.0	37.0	.00	.0	1
2	120.0	120.0	150.0	20.0	.00	.0	1
3	120.0	120.0	150.0	20.0	.00	.0	1
4	120.0	120.0	.0	36.0	.00	.0	1
5	140.0	140.0	5000.0	36.0	.00	.0	1
6	130.0	130.0	200.0	37.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

UNITWEIGHT OF WATER = 62.40

PIEZOMETRIC SURFACE NO. 1 SPECIFIED BY 6 COORDINATE POINTS

POINT NO.	X-WATER	Y-WATER
1	.00	96.00
2	50.00	96.00
3	60.00	98.00
4	76.00	104.00
5	120.00	115.00
6	200.00	120.00

A CRITICAL FAILURE SURFACE SEARCHING METHOD, USING A RANDOM TECHNIQUE FOR GENERATING CIRCULAR SURFACES, HAS BEEN SPECIFIED.

2500 TRIAL SURFACES HAVE BEEN GENERATED.

50 SURFACES INITIATE FROM EACH OF 50 POINTS EQUALLY SPACED ALONG THE GROUND SURFACE BETWEEN X = 60.00
AND X = 80.00

EACH SURFACE TERMINATES BETWEEN X = 100.00
AND X = 200.00

UNLESS FURTHER LIMITATIONS WERE IMPOSED, THE MINIMUM ELEVATION AT WHICH A SURFACE EXTENDS IS Y = .00

10.00 FT. LINE SEGMENTS DEFINE EACH TRIAL FAILURE SURFACE.

FOLLOWING ARE DISPLAYED THE TEN MOST CRITICAL OF THE TRIAL FAILURE SURFACES EXAMINED. THEY ARE ORDERED - MOST CRITICAL FIRST.

SAFETY FACTORS ARE CALCULATED BY THE MODIFIED BISHOP METHOD.

1
AGEC
Midvale UT s/n5206

FAILURE SURFACE # 1 SPECIFIED BY 6 COORDINATE POINTS

SAFETY FACTOR = 1.455

X-CENTER = 87.38
Y-CENTER = 126.11
RADIUS = 24.00

POINT NO.	X-SURF	Y-SURF	ALPHA (DEG)
1	74.29	106.00	-21.04
2	83.62	102.41	3.01
3	93.61	102.93	27.06
4	102.51	107.48	51.11
5	108.79	115.27	75.16
6	110.54	121.86	

--SLOPE STABILITY ANALYSIS--
SIMPLIFIED JANBU METHOD OF SLICES
IRREGULAR FAILURE SURFACES

PROBLEM DESCRIPTION Richardson A-A' - 3:1 Fill Slope

BOUNDARY COORDINATES

3 TOP BOUNDARIES
11 TOTAL BOUNDARIES

BOUNDARY NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SOIL TYPE BELOW BND
1	.00	96.00	26.00	96.00	2
2	26.00	96.00	104.00	122.00	6
3	104.00	122.00	200.00	120.00	1
4	92.00	114.00	104.00	122.00	1
5	92.00	114.00	200.00	114.00	2
6	26.00	96.00	60.00	96.00	2
7	60.00	96.00	76.00	104.00	2
8	76.00	104.00	92.00	114.00	2
9	.00	92.00	200.00	92.00	3
10	.00	86.00	200.00	86.00	4
11	.00	81.00	200.00	81.00	5

ISOTROPIC SOIL PARAMETERS

6 TYPE(S) OF SOIL

SOIL TYPE NO.	TOTAL UNIT WT.	SATURATED UNIT WT.	COHESION INTERCEPT	FRICTION ANGLE (DEG)	PORE PRESSURE PARAMETER	PRESSURE CONSTANT	PIEZOMETRIC SURFACE NO.
1	130.0	130.0	200.0	37.0	.00	.0	1
2	120.0	120.0	150.0	20.0	.00	.0	1
3	120.0	120.0	150.0	20.0	.00	.0	1
4	120.0	120.0	.0	36.0	.00	.0	1
5	140.0	140.0	5000.0	36.0	.00	.0	1
6	130.0	130.0	200.0	37.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

UNITWEIGHT OF WATER = 62.40

PIEZOMETRIC SURFACE NO. 1 SPECIFIED BY 6 COORDINATE POINTS

POINT NO.	X-WATER	Y-WATER
1	.00	96.00
2	50.00	96.00
3	60.00	98.00
4	76.00	104.00
5	120.00	115.00
6	200.00	120.00

A CRITICAL FAILURE SURFACE SEARCHING METHOD, USING A RANDOM TECHNIQUE FOR GENERATING CIRCULAR SURFACES, HAS BEEN SPECIFIED.

2500 TRIAL SURFACES HAVE BEEN GENERATED.

50 SURFACES INITIATE FROM EACH OF 50 POINTS EQUALLY SPACED ALONG THE GROUND SURFACE BETWEEN X = .00
AND X = 60.00

EACH SURFACE TERMINATES BETWEEN X = 100.00
AND X = 200.00

UNLESS FURTHER LIMITATIONS WERE IMPOSED, THE MINIMUM ELEVATION AT WHICH A SURFACE EXTENDS IS Y = .00

10.00 FT. LINE SEGMENTS DEFINE EACH TRIAL FAILURE SURFACE.

FOLLOWING ARE DISPLAYED THE TEN MOST CRITICAL OF THE TRIAL FAILURE SURFACES EXAMINED. THEY ARE ORDERED - MOST CRITICAL FIRST.

SAFETY FACTORS ARE CALCULATED BY THE MODIFIED BISHOP METHOD.

1
AGEC
Midvale UT s/n5206

FAILURE SURFACE # 1 SPECIFIED BY 13 COORDINATE POINTS

SAFETY FACTOR = 1.472

X-CENTER = 49.58
Y-CENTER = 167.70
RADIUS = 81.41

POINT NO.	X-SURF	Y-SURF	ALPHA (DEG)
1	11.02	96.00	-24.75
2	20.10	91.81	-17.71
3	29.63	88.77	-10.67
4	39.46	86.92	-3.62
5	49.44	86.29	3.42
6	59.42	86.88	10.46
7	69.25	88.70	17.50
8	78.79	91.71	24.55
9	87.88	95.86	31.59
10	96.40	101.10	38.63
11	104.22	107.34	45.67
12	111.20	114.50	52.71
13	116.71	121.74	

2500 TRIAL SURFACES HAVE BEEN GENERATED.

50 SURFACES INITIATE FROM EACH OF 50 POINTS EQUALLY SPACED ALONG THE GROUND SURFACE BETWEEN X = .00
AND X = 60.00

EACH SURFACE TERMINATES BETWEEN X = 100.00
AND X = 200.00

UNLESS FURTHER LIMITATIONS WERE IMPOSED, THE MINIMUM ELEVATION AT WHICH A SURFACE EXTENDS IS Y = .00

10.00 FT. LINE SEGMENTS DEFINE EACH TRIAL FAILURE SURFACE.

FOLLOWING ARE DISPLAYED THE TEN MOST CRITICAL OF THE TRIAL FAILURE SURFACES EXAMINED. THEY ARE ORDERED - MOST CRITICAL FIRST.

SAFETY FACTORS ARE CALCULATED BY THE MODIFIED BISHOP METHOD.

1
AGEC
Midvale UT s/n5206

FAILURE SURFACE # 1 SPECIFIED BY 9 COORDINATE POINTS

SAFETY FACTOR = 1.415

X-CENTER = 79.76
Y-CENTER = 137.36
RADIUS = 48.15

POINT NO.	X-SURF	Y-SURF	ALPHA (DEG)
1	55.10	96.00	-24.85
2	64.18	91.80	-12.93
3	73.92	89.56	-1.01
4	83.92	89.39	10.91
5	93.74	91.28	22.84
6	102.96	95.16	34.76
7	111.17	100.86	46.68
8	118.03	108.14	58.60
9	120.74	112.57	

--SLOPE STABILITY ANALYSIS--
SIMPLIFIED JANBU METHOD OF SLICES
IRREGULAR FAILURE SURFACES

PROBLEM DESCRIPTION Richardson B-B

BOUNDARY COORDINATES

5 TOP BOUNDARIES
9 TOTAL BOUNDARIES

BOUNDARY NO.	X-LEFT	Y-LEFT	X-RIGHT	Y-RIGHT	SOIL TYPE BELOW BND
1	.00	96.00	60.00	96.00	2
2	60.00	96.00	110.00	112.00	2
3	110.00	112.00	148.00	114.00	2
4	148.00	114.00	169.00	124.00	1
5	169.00	124.00	200.00	124.00	1
6	148.00	114.00	200.00	114.00	2
7	.00	92.00	200.00	92.00	3
8	.00	86.00	200.00	86.00	4
9	.00	81.00	200.00	81.00	5

ISOTROPIC SOIL PARAMETERS

5 TYPE(S) OF SOIL

SOIL TYPE NO.	TOTAL UNIT WT.	SATURATED UNIT WT.	COHESION INTERCEPT	FRICTION ANGLE (DEG)	PORE PRESSURE PARAMETER	PRESSURE CONSTANT	PIEZOMETRIC SURFACE NO.
1	130.0	130.0	200.0	37.0	.00	.0	1
2	120.0	120.0	150.0	20.0	.00	.0	1
3	120.0	120.0	150.0	20.0	.00	.0	1
4	120.0	120.0	.0	36.0	.00	.0	1
5	140.0	140.0	5000.0	36.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

UNITWEIGHT OF WATER = 62.40

PIEZOMETRIC SURFACE NO. 1 SPECIFIED BY 4 COORDINATE POINTS

POINT NO.	X-WATER	Y-WATER
1	.00	96.00
2	60.00	96.00
3	92.00	106.00
4	200.00	124.00

A CRITICAL FAILURE SURFACE SEARCHING METHOD, USING A RANDOM
TECHNIQUE FOR GENERATING CIRCULAR SURFACES, HAS BEEN SPECIFIED.

APPENDIX E

United Park Health and Safety Policy
Remedial Design/Remedial Action plan
Richardson Flat Site
Park City, Utah

Site ID Number: UT980952840

Prepared for:

United Park City Mines Company
P.O. Box 1450
Park City, Utah 84060

Prepared by:

Resource Management Consultants, Inc
8138 South State Street, Ste. 2A
Midvale, Utah 84047
801-255-2626

December 2007

Figures
Emergency Route to Hospital

Appendix
Emergency Contact Phone Numbers

1.0 INTRODUCTION

This Health and Safety Policy (HASP) is intended to protect all employees, general contractors, subcontractors, construction workers and/or visitors conducting or observing any activities under the direction of United Park City Mines Company (United Park). This HASP is intended to apply to activities taking place at the Richardson Flat tailings impoundment (Site), and covers both investigation and construction. The policy is intended to minimize potential exposures and/or accidents that may occur, and details the actions to be taken during an emergency. The HASP will establish required procedures intended to minimize exposures of United Park personnel, construction personnel, contractors, visitors and the surrounding community. Guidelines contained herein that are appropriate to the activities taking place at the Site will be observed at all times.

All personnel will be required to understand and observe the provisions of this plan. Any tasks associated with investigation or remediation activities on the Site must be performed in accordance with this policy, designed to ensure that employees are adequately protected from any potential chemical and/or physical hazards present at the Site. To help ensure safety compliance, all field participants and observers must read this plan and sign a certification stating that they agree to comply with the conditions of the policy. All activities conducted will be in accordance with 29 CFR part 1910, *OSHA standards for general industry.*

1.1 Site Description

The Site is located in Summit County, Utah, located two miles northeast of Park City, Utah. The 260-acre Site includes a tailings impoundment that covers approximately 160 acres. Mining does not occur on-site.

Construction personnel will be on-Site for remediation and related work. United Park and its consultants will be investigating the soil and water in and around the Site. Construction contractors will be performing remedial activities. During the course of construction, thepotential exists for personnel to come into contact with mining materials contained on the Site. The Site consists of mine processing features such as a tailings impoundment, soil stockpiles and rock stockpiles surrounded by undisturbed areas. The Site contains two diversion ditches and multiple wetland areas.

1.2 Site Activities

This HASP is intended to address the risks associated with sampling and remedial construction which will take place at the Site. During the course of investigation by United Park, personnel will be required to visit the Site in order to collect soil and water samples for chemical analysis. Personnel will also visit the Site to survey and perform other miscellaneous tasks. Remedial construction at the Site will occur year-round. The procedures contained in this HASP are intended to protect those personnel from potential hazards while carrying out their duties, and provide them with information necessary in the event of an emergency.

Construction will involve placement, excavation and/or removal of soils. The HASP has therefore included procedures for equipment and personnel involved in construction activities at the Site. Construction workers may receive the greatest exposures to materials containing elevated levels of lead and arsenic in tailings via ingestion, inhalation or dermal exposure, procedures described in this HASP are designed to monitor and minimize these exposures.

2.0 PROJECT MANAGEMENT

Efficient implementation of this policy requires that the roles, responsibilities and scope of authority for key personnel be identified. United Park shall identify individuals responsible the following positions:

2.1 Project Manager

The Project Manager is responsible for implementation of the work plan and compliance with the HASP.

2.2 Health and Safety Manager

The Health and Safety Manager will have a thorough working knowledge of state and federal occupational safety and health regulations in addition to thorough knowledge and understanding of this policy. The Health and Safety Manager will have the authority to temporarily suspend Site operations in order to ensure Site safety and resume normal operations once the appropriate measures have been taken. The Health and Safety Manager will report directly to the Project Manager.

2.3 Site Manager

The Site Manager will be present during the majority of site activities and will be responsible for general Site operations, supervision and enforcement of this HASP. The Site Manager will report directly to the Health and Safety Manager.

2.4 Supervisor

The Supervisor(s) will be present during all on-Site activities and will report directly to the Site Manager.

Note: The aforementioned personnel may be increased, or personnel may share responsibilities dependent upon specific site conditions.

3.0 TRAINING

3.1 Off-Site Training

All full-time, part-time and short-duration personnel must hold current certification of the Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) 40-hour training. Visitors must hold current certification of OSHA/HAZWOPER 40-hour training and shall be escorted at all times by an experienced and trained Site Manager.

3.2 On-Site Training

An informational training program implemented by United Park will cover on-Site training.

3.3 Weekly Health and Safety Meetings - Construction

During any construction or excavation activities, the Site Health and Safety Manager will conduct mandatory weekly safety meetings for all Site personnel. The meetings will provide time for refresher courses, and new Site conditions will be examined as they are encountered.

4.0 MEDICAL SURVEILLANCE

4.1 Medical Surveillance - General

Medical surveillance will be obtained if personnel:

- Receive, or may have received, a possible overexposure to on-Site contaminants;
- Sustain an injury requiring medical attention or hospitalization;
- Experience an unexplained or serious illness.

4.2 Medical Surveillance - Construction

If construction personnel are exposed to tailings materials on-Site for thirty (30) days or more, they will participate in a medical examination program according to OSHA's lead standard (29 CFR 1926.65).

5.0 HEALTH AND SAFETY PROTECTION

5.1 Substance Hazards

Lead and arsenic are known to exist on the Site, and personnel should be briefed on exposure and health hazards. It is not anticipated that exposures to these substances will exceed OSHA's Permissible Exposure Limit (PEL). The following table lists the primary hazards associated with significant exposure to each substance.

Lead	Toxic on inhalation and ingestion; probable human carcinogen
Arsenic	Toxic on inhalation and ingestion; skin irritant; known human carcinogen.

5.2 Safety Hazards

Investigation and construction activities may expose field personnel to potential physical hazards including, but not limited to:

- Holes and ditches
- Water features
- Uneven terrain
- Slippery surfaces
- Electrical equipment
- Mobile equipment
- Overhead hazards
- Underground hazards
- Construction equipment

5.3 Personal Protective Equipment - Construction

The minimum level of protection used during any construction activities is level D, requiring the following items:

- Hardhat;
- Steel-toed boots;
- Safety glasses;
- Cotton coveralls;
- Work gloves;
- Sampling gloves;
- Hearing protection, when needed.

5.4 Personal Air Monitoring – Construction

During construction involving contact of mining materials, personal air monitoring will be conducted to verify and document that exposures to lead and arsenic on this project do not exceed the OSHA PELs. If monitoring reveals exposures above an OSHA PEL, then field personnel will be upgraded to Level C protection.

5.4.1 Work Practices to Reduce Employee Exposure - Construction

While performing any construction or excavation, engineering controls will be used to ensure worker exposure remains below the applicable PEL. Engineering controls will

include wetting down excavation-sites as needed during any excavation. The Site Safety Officer will be responsible for monitoring dust control when needed.

5.5 Exposure to Elements

5.5.1 Heat Stress

The potential for heat stress depends on the type of protective gear being worn, the ambient temperature and the worker's level of activity. Personnel will report any cases of dizziness, excessive sweating, increased respiratory rate, or pulse and are to leave the work area immediately if these conditions are noted. Work cycle lengths will be based initially on subjective input from personnel, and will be reduced and a monitoring program will be initiated if the above conditions are encountered. Work cycles will also be reduced if a pulse rate of greater than 110 is noticed during rest. Personnel with elevated rates will not return to work until their pulse has lowered to their resting rate.

Workers exhibiting signs of heat stress will have their oral temperature measured at the beginning of a rest period before liquid intake. If oral temperature exceeds 99.6° F, the next work cycle will be shortened by one-third without changing the rest period. If the oral temperature still exceeds 99.6° F at the beginning of the next rest period, the next work cycle will be shortened by another one-third. If the oral temperature exceeds 100.6° F, the worker will not be allowed to wear semi-permeable or impermeable clothing. If an employee is overcome with heatstroke or becomes unconscious, the 9-1-1 service will be called. First-aid procedures will be used for heat related conditions, as necessary. Some of the signs and symptoms of heat stress are as follows:

5.5.1.1 Heat Rash

Symptoms of Heat Rash include:

- Profuse tiny raised vesicles on the skin
- Pricking sensations during heat exposure

5.5.1.2 Heat Cramps

Symptoms of Heat Cramps include:

- Painful spasms of muscles used during work
- Onset during or after work hours

5.5.1.3 Heat Exhaustion

Symptoms of Heat Exhaustion include:

- Fatigue
- Nausea
- Headache

- Giddiness
- Clammy and moist skin
- Pale complexion
- Upon standing, fainting possible, with rapid, thready pulse and low blood pressure

5.5.1.4 Heatstroke

Symptoms of Heatstroke include:

- Hot dry skin usually red, mottled or cyanotic
- Confusion, loss of consciousness, and convulsions

Note: Heat stroke may be fatal if treatment is delayed

5.5.2 Cold Stress

During on-Site activities, workers may be exposed to cold temperatures. Exposure to cold temperatures increases the likelihood and potential for disorders or conditions that could result in injury or illness. Factors leading to hypothermia and frostbite include ambient temperature, wind velocity, exposure time and insufficient cold-weather protective gear. Signs of excess cold exposure include uncontrollable fits of shivering, slurred speech, memory lapses, immobile hands, stumbling, drowsiness, and exhaustion. Treatments for these symptoms are to get the victim out of the wind and cold, remove wet clothing, supply a warm drink, and keep victim warm with blankets or clothing.

5.5.2.1 Hypothermia

The first symptoms of this condition are uncontrollable shivering and the sensation of cold, irregular heart beat, weakened pulse, and change in blood pressure. Severe shaking of rigid muscles may be caused by a burst of body energy and changes in the body's chemistry. Vague or slow slurred speech, memory lapses, incoherence, and drowsiness are some of the additional symptoms. Symptoms noticed before complete collapse are cool skin, slow and irregular breathing, low blood pressure, apparent exhaustion, and fatigue even after rest. As the core body temperature drops, the victim may become listless and confused, and may make little or no attempt to keep warm. Pain in the extremities can be the first warning of dangerous exposure to cold. If the body core temperature drops to about 85° F, a significant and dangerous drop in the blood pressure, pulse rate, and respiration can occur. In extreme cases, death will occur.

5.5.2.2 Frostbite

Frostbite occurs when the extremities do not receive sufficient heat from the central body and can happen in the absence of cold stress or hypothermia. This can occur because of inadequate circulation and/or insulation. Frostbite occurs when there is freezing of fluids around the cells of the body tissues due to extremely low temperatures. Damage may result, including loss of tissue around the areas of the nose, cheeks, ears, fingers, and

toes. This damage can be serious enough to require amputation or result in permanent loss of movement.

Note: The potential for both heat and cold related disorders or conditions can occur in many common situations. Cold early morning temperatures can give way to warm daily temperatures, resulting in heavy perspiration within protective clothing. As temperatures cool again in the evening, the potential for cold related disorders or conditions can occur. Managers should be aware of the potential for this occurrence and should monitor workers accordingly.

5.5.3 Wind Exposure

Extreme low temperatures may not be the required to create the potential for cold exposure problems; strong wind accompanied by cold temperatures can lead to these types of problems. The wind-chill factor is the cooling effect of any combination of temperature and wind velocity. The wind-chill factor should be considered when planning for exposure to low temperatures and wind.

5.6 Logs and Reports

United Park will maintain all records required by OSHA, Worker's Compensation Insurance and similar regulations. This will include the maintenance of accident logs, the OSHA annual summary report and the posting of all prescribed notices.

6.0 SITE CONTROL

Site control will be implemented for both investigation and construction activities as needed.

6.1 Investigation

6.1.1 Work Zone

Various work zones are located throughout the Site. Individual work zones will be identified on an as-needed basis. These areas will be restricted to appropriately trained personnel, and any non-approved personnel will immediately be escorted off-site.

6.1.2 Cleaning/Maintenance Area

At the entrance(s) of the work zones, an area will be provided for removal of gross contamination from both hand tools and personnel. United Park personnel and/or representatives will remove gross contamination from their boots and coveralls. Facilities will be provided for personnel to wash their hands and face as needed. At a minimum, facilities will include fresh water, soap, towels and a waste receptacle.

6.2 Construction

6.2.1 Work Zone

The Site will be fenced prior to the start of construction. All construction work carried out at the Site will occur within the individual work zones. Work areas may pose a potential hazard and will be restricted to trained workers with appropriate PPE. Any excavation-sites will be marked with yellow barrier tape, and may be backfilled prior to the end of each workday. An area that has been backfilled with clean material will be considered free of chemical hazards. Physical hazards such as holes, ditches or construction equipment may still exist, and such hazards will be marked with barrier tape.

6.2.2 Cleaning/Maintenance Area

At the entrance(s) of each work zone, a decontamination area will be provided. United Park or other Site personnel having contact with any potentially contaminated material will be required to remove gross contamination from their vehicles, equipment, boots and coveralls prior to leaving the Site. At a minimum, pressurized water, scrub tools, fresh water, soap, towels and a waste receptacle will be provided.

6.3 General Maintenance

Regular cleaning and maintenance is key to maintaining acceptable exposure levels for lead and arsenic. Cleaning and maintenance will be required for all equipment and facilities used by on-Site as well as off-Site personnel. This will include, but is not limited to, a place to change clothes and shower, office areas, and lunch facilities outside of the work area.

6.4 Equipment Safety

All mobile equipment with limited rear visibility will be equipped with audible back-up alarms. If mobile equipment operates at night, it will be equipped with headlights and taillights. All equipment will be maintained in good working condition. When an operator leaves their equipment, emergency brakes will be set and any hydraulics released. If a truck is parked on an incline, the tires will be chocked.

When refueling, engines will be shut off. All mobile equipment will be supplied with a fire extinguisher with a minimum 5-B rating, and the service truck will be supplied with a fire extinguisher with a minimum 20-B rating.

6.5 Electrical Safety

Electrical power tools will be routinely inspected. Electric tools with frayed cords or broken housings will be tagged and taken out of service.

If tools are used in wet conditions, they must be listed or labeled as double insulated. All extension cords will be of the three-wire ground type and be connected to a ground fault

circuit interrupter (GFCI). If extension cords are not plugged into a permanently mounted GFCI, then the extension cord must be supplied with a waterproof GFCI. Extension cords that are spliced, worn, or frayed will not be used. Extension cords must have the manufacturers rating on the cord and it must be legible; if it is not legible the cord will be taken out of service.

6.6 Miscellaneous Site Safety Rules

Miscellaneous Site Safety Rules include the following:

- A minimum of two personnel shall be on-site at all times.
- No misbehavior is permitted at any time
- Vehicles used to transport personnel will have seats firmly secured and enough seats for the number of persons to be carried.
- Seat belts and anchors meeting the requirements of 49 CFR part 571 (department of transportation, federal motor vehicle safety standards) will be installed in all motor vehicles.

7.0 DECONTAMINATION

7.1 Field Personnel

Decontamination procedures for field personnel shall be:

- Removal of gross contamination from clothing and boots prior to leaving the Site.
- Wash hands and face at facility provided
- Containment of dirty coveralls.
- Launder coveralls at commercial laundry.

7.2 Equipment

The decontamination procedures for equipment contacting mine rock shall be:

- Clean vehicles (inside and out) as needed prior to leaving the Site.
- Construction equipment, backhoes, loaders, dump trucks, hand tools, trailers, hoses, etc. contacting any tailings material will be cleaned of gross contamination before leaving the Site and pressure washed when scheduled work is completed.
- Sampling equipment and hand tools not contacting potentially contaminated materials will be cleaned of gross contamination prior to leaving the Site.

8.0 EMERGENCY RESPONSE

Accidents or potentially hazardous conditions will be handled in a manner that minimizes the health risk to personnel. Accidents and hazardous conditions will be reported to the Site Safety Officer. Prior to start-up of the project, communication procedures will be established that will ensure emergency services are summoned in a timely manner. Supervisory personnel and the Site Safety Officer will be trained in first aid/CPR.

8.1 Emergency Route to Hospital

The route to local medical facilities is shown in Figure 1 and emergency contacts with phone numbers are listed in Appendix A

8.2 Incident Command System

The Incident Command System used on this project will utilize different senior response officials depending on the nature of the incident. Front line supervisors are the initial "Senior Official" until the Project Manager or the Health and Safety Manager arrives. When emergency officials arrive, they shall become the "Senior Official".

8.3 Response Procedures

All United Park personnel will be trained in general emergency procedures. Prior to beginning any work, personnel will be required to review the emergency procedures of this plan and ensure that all necessary equipment is ready for use in the event of an emergency. Visitors to the Site should also be briefed on these procedures.

Common forms of emergency include, but are not limited to fires, explosions, spills, sudden changes in weather, and personal illness or injury. The following emergency response procedures have been developed to help ensure a timely and efficient response to emergency situations that may arise.

8.3.1 Major and Minor Personal Injury

If field personnel are injured, the incident scene will be evaluated for immediate hazards and actions taken to eliminate those hazards. Once the incident scene is safe, the "Senior Official" will make an evaluation of the injured person. Seriously injured personnel should not be moved unless their life is in immediate danger and until a person trained in first-aid and CPR has made an assessment.

If the victim is conscious, first-aid may only be administered with the injured person's permission. If the victim is unconscious or unable to respond, then no permission is required to provide standard first aid. If no outside emergency services are needed, the "Senior Official" will arrange for the injured person to be transported to a medical facility.

If it is determined that emergency medical services are needed, the emergency services listed in Appendix A will be contacted as soon as possible. Calling for help is often the most important action to be taken. If you are the only person with the injured employee and urgent care is needed, provide initial critical care and then contact the outside emergency services. Return to care for the victim as soon as possible.

First-aid or other appropriate actions can be administered by the initial "Senior Official" or by the victim. For injuries requiring medical treatment such as a laceration requiring stitches or a sprained ankle, the "Senior Official" shall arrange transportation to the emergency facility as noted in Figure 1. For major injuries, the "Senior Official" may administer first-aid. The "Senior Official" rendering assistance will not place themselves in a situation of unacceptable risk.

8.3.2 Fire or Explosion

In the event of a fire or explosion, the local fire department will be notified immediately. The "Senior Official" will notify emergency services, inform them of the location and nature of the fire and identify any hazardous materials on-Site.

During the beginning stages, the closest person to the incident will take measures to extinguish the fire using a fire extinguisher or water hose. If the fire progresses beyond the beginning stages, the "Senior Official " will evacuate workers and any other occupants of the property from the immediate area and allow local fire officials to handle the situation.

8.4 Notification and Documentation Procedures

As soon as practical following an accident/incident, the accident/incident will be documented using the appropriate report forms and the Site Safety Officer will be notified.

8.5 On-Site Emergency Equipment

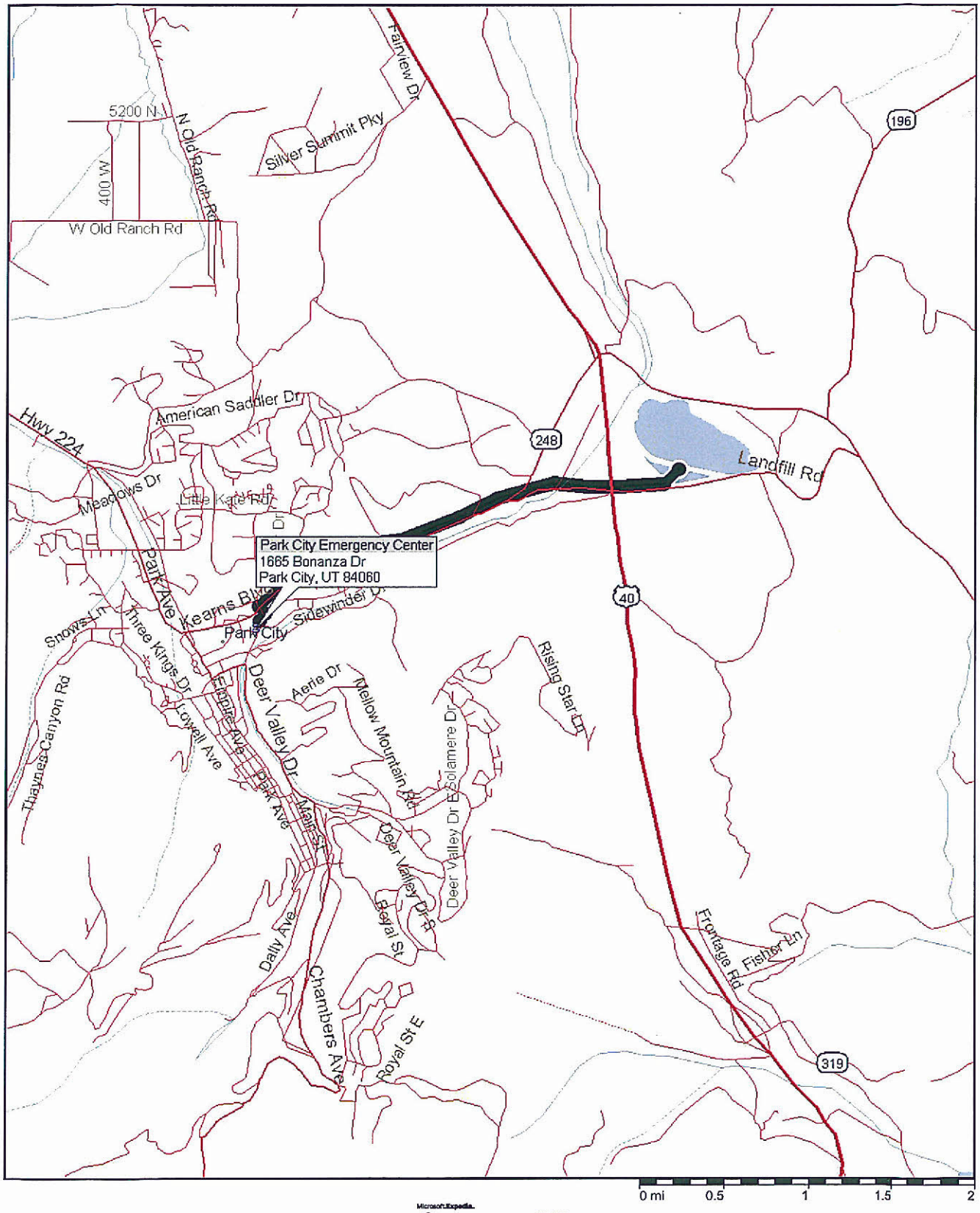
The following emergency equipment will be maintained at all work sites.

- Cellular Telephone;
- First-aid kit;
- Fire extinguisher; and
- Emergency eye wash solution.

Appendix A – Emergency Contact Phone Numbers

Organization	Telephone
Any Emergency	**911**
Ambulance:	911
Local Police:	435-645-5500
Fire:	911
State Police:	801-576-8606
Hospital (Primary)	435-649-7640
Hospital (Secondary)	435-655-0055
Poison Control Center:	801-581-2151
Regional EPA:	800-227-8917
EPA Emergency Response Team:	800-227-8914
National Response Center:	800-424-8802
Center for Disease Control:	404-639-3311
Chemtrec:	800-262-8200
Spill Center:	978-897-6461
Site Emergency Operations Center:	801-355-2350
DOE Emergency Operations Center (National Center):	202-586-5000

Figure 1, Emergency Route to Hospital



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APPENDIX F

DRAFT
OPERATIONS AND MAINTENANCE PLAN
RICHARDSON FLAT SITE

EPA SITE ID: UT980952840

12/7/07

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DRAFT

1.0 INTRODUCTION

This Draft Operations and Maintenance (O&M) Plan has been prepared to describe post closure O&M procedures at Richardson Flat (Site), EPA Site ID UT980952840. This Plan will document how remedies specified in the Record of Decision (ROD, EPA, 2005) and implemented as per the Remedial Design/ Remedial Action Work Plan (RD/RA, RMC, 2007) will be operated and maintained upon completion.

This O&M Plan describes the administrative and technical details and requirements for inspecting, operating and maintaining the Remedial Action and institutional controls. O&M at the Site will involve:

- Maintaining engineered waste containment measures (e.g. soil cover);
- Routine surface water and reclamation monitoring to ensure that the remedy is performing as expected and the environment is protected; and
- Maintaining and enforcing institutional controls and access restrictions.

This O&M Plan is being submitted as a draft attachment to the RD/RA. The O&M Plan will be finalized upon completion of the selected remedy when final Site use is determined.

A summary of inspection and maintenance procedures is presented in Table 1-1. A Site features map is presented in Figure 1-1.

1.1 Remedy Description

The remedy was specified in the ROD and was evaluated during the Focused Feasibility Study (FS, RMC, 2004) for the Site. The selected remedial alternative contains the following elements:

- Removal of contaminated materials in selected areas south of the South Diversion Ditch (Area B) where tailings may be in contact with surface water or shallow groundwater. Excavation will extend to the visual interface between the tailings and native soils or to a depth where a clay soil cover can be placed;
- Removal of contaminated materials in the wetland west of the main embankment. This would include excavation of contaminated material to achieve the Site PRG of 310 parts per million (ppm) lead. This activity will only be performed after remedial activities are completed in the South Diversion Ditch;
- Placing excavated materials in the impoundment. The impoundment will be used by United Park and others to accommodate similar Bevill-exempt mine waste in the upper Silver Creek watershed;
- Placement of a minimum twelve inches of low permeability soil cover on areas where tailings are left in-place, including the impoundment. The cover will be machine compacted. Upon completion of the low permeability soil cover, a six-inch topsoil cover will be placed. The final surface cover will be a minimum of eighteen inches thick and the surface will be graded to control surface stormwater runoff and drainage;
- Placement of twelve-inches of clean gravel over contaminated sediments in the South Diversion Ditch, including the pond located near the terminus of the ditch. Additional discussions with EPA and in consideration of potential Natural Resource Damages UPCM may remove contaminated sediments in the ditch and pond;
- Installation of a rock wedge buttress along the oversteepened portion of the embankment for about 400 feet of the total embankment length of 800 feet;
- Regrading and revegetation of areas affected by remediation at the Site. Areas in which tailings are removed will be restored, where possible, to pre-tailings topographic conditions; and
- Monitoring Site conditions (vegetation and erosion) on a bi-annual basis for two to five years. Surface water will be monitored for total and dissolved cadmium,lead, zinc and hardness according to Section 2.2 in the SOW.

2.0 OPERATION

Site operations will be dependent on final land use at the Site which is currently expected to be a combination of recreation and open space.

2.1 Site Responsibilities

O&M at the site will be financed and conducted by United Park. Kerry Gee will be the Project Coordinator for United Park and will manage O&M activities. Environmental consultants at Resource Management Consultants, Inc. (RMC) and civil engineers and surveyors from Alliance Engineering, Applied Geotechnical Engineering Consultants and Golder Associates will assist Mr. Gee. The EPA Project Manager will be Kathryn Hernandez. Site management is presented on Figure 2-1.

If required, equipment to rectify erosion and/or vegetation problems at the Site will be provided by United Park or a qualified contractor.

2.2 Post Remedial Operation

Future land use at Richardson Flat is anticipated to be recreation, open space or other uses that may benefit the overall public as approved in accordance with the Development Agreement between United Park and Park City. On a portion of the Site, approximately 60 acres, recreational facilities such as soccer and baseball fields may be constructed. Final management of the sports facilities has not been determined at this time.

2.3 Site Access and Ownership

The Site is currently owned by United Park. United Park will control access to portions of the Site based on use on an as-needed basis. Areas containing hazardous materials will be signed and fenced as required.

Workers entering the Site will be notified of Site conditions. Workers such as utility workers who may come into contact with contaminated material will require training as specified in Section 4.0.

3.0 DESCRIPTION OF O&M ACTIVITIES

This section describes post remedial O&M activities for the Site.

3.1 Monitoring

All monitoring at the Site will be conducted in accordance with the Site Field Sampling Plan for Remedial Activities (FSP, RMC, 2007b).

Surface Water

Post remedial surface water monitoring will be conducted quarterly for a period of two years at the terminus of the South Diversion Ditch (SDD). Surface water monitoring will not be conducted until remediation is completed at the Site. Field measurements will include pH, conductivity and temperature. Surface water will be monitored cadmium, lead, zinc (total and dissolved) and hardness on a quarterly basis for two years as described in Section 2.2 of the SOW. Surface monitoring procedures are described in Section 6.2.

Reclamation

Post remedial reclamation (vegetation) monitoring will be conducted bi-annually for a period of two to five years, or until 3 inspections pass with no maintenance work required. Vegetative monitoring includes both permanent and non-permanent transects which will be used for measuring upland and wetland herbaceous vegetation. Vegetation monitoring procedures are described in Section 6.1.

Drainage and Erosion

Post remedial erosional monitoring will be conducted bi-annually for a period of two to five years, or until 3 inspections pass with no maintenance work required. Drainage inspections will include visually observing all drainage channels, berms and rip-rap areas for damage. In addition, inspection of Site drainages will be made after storm events that meet or exceed the design storm return frequency (25-year/24-hour).

Drainage inspections will also include inspection of soil cover areas. The integrity of the soil cover will be inspected. Drainage monitoring procedures are described in Section 6.1.2.

3.2 Maintenance of Institutional Controls

United Park personnel or their designated representative will operate the Site according to the following short- and long-term institutional controls (IC's):

Short-term IC's

1. Site access will be controlled with fencing and ingress/egress gates.
2. Signs will inform visitors of certain hazards (e.g. presence of mine wastes on the impoundment, active construction area).

3. During implementation of the Remedial Action, all Site visitors will be required to sign-in with the United Park Project Manager or his designated representative.
4. Annual monitoring of the soil cover and vegetation for indications of erosion for a period of five years.
5. Water quality monitoring for a period of two years.

Long-Term ICs

1. After remediation, land use within the Study Area Boundary will be deed restricted to a recreation, open space or other publicly beneficial use in accordance with the Development Agreement mentioned in Section 2.2.
2. A restriction will be placed on withdrawal of shallow groundwater from the alluvial aquifer for domestic, industrial, or agricultural uses within the Study Area Boundary.

3.3 Access Control

Site access will be monitored and controlled as needed. Access to unauthorized areas of the Site will be controlled with signs and fences. The integrity of signs and fences will be inspected concurrently with other Site inspections and visits.

4.0 SAFETY REQUIREMENTS

All Site personnel will comply with the United Park Health and Safety Policy, RDRA Activities, Richardson Flat Site (HASP, RMC, 2007c)

All Site personnel and contractors with the potential to work with or encounter contaminated materials will have appropriate health and safety training including OSHA certification as required by 29 CFR 1910.120.

All areas containing potential exposures to hazardous materials will be signed and fenced accordingly.

5.0 SUMMARY OF O&M PERFORMANCE STANDARDS

Post remedial O&M performance standards include the following:

Source removal

Source removal areas will be maintained with a six-inch cover of topsoil and/or protective rock armor. The primary performance standards in source removal areas will be the integrity of revegetation and erosion control measures, i.e. is revegetation functioning properly without undue erosion.

Soil Cover

Soil cover will be maintained at eighteen inches with a vegetative and/or armored rock protective cover. Performance of the cover will be monitored with erosion and vegetation inspections. The primary performance standards will be the integrity of revegetation and erosion measures, i.e. revegetation is functioning properly without undue erosion.

Wedge Buttress

The wedge buttress will be maintained to insure the stability of the structure. Maintenance inspections will include inspection of buttress integrity and repair of any areas undergoing erosion. The primary performance standard will be the integrity of the wedge buttress.

South Diversion Ditch

Surface water will be sampled at the terminus of the South Diversion Ditch. Total and dissolved cadmium, lead and zinc will be monitored to comply with applicable water quality standards. The primary performance standards are the State of Utah Water Quality standards.

Institutional Controls

The Site will be operated to comply with the Institutional Controls specified in Section 3.2. In summary:

Groundwater use restrictions within the Site boundary will be complied with. The goal is to preclude any use of shallow groundwater, as well as eliminate any significant alteration of the existing hydrogeologic system, such as mixing of aquifers. This IC will be in the form of a deed restriction and will be the responsibility of the owner of the Site.

Land-use restrictions within the Site boundary will be complied with. The goal is to preclude non-recreational uses and to ensure that soil cover and similar protections are maintained. This IC will be in the form of an Environmental Covenant and will be the responsibility of the owner of the Site.

IC performance will be based on maintaining the above described deed restrictions and Environmental Covenant.

Placement of Additional Waste at the Site

The placement of additional waste at the Site will not occur in areas that have been closed. Waste placement will occur in designated areas and will be transported and placed in a manner that does not impact areas in which remedies are complete. The

primary performance standard is that waste is placed according to Site protocols and the above described performance standards are adhered to.

6.0 INSPECTION AND MAINTENANCE PROCEDURES

This section details post-remedial inspection and maintenance procedures. Sampling conducted during inspection will be conducted according to procedures described in the Field Sampling Plan for Remedial Activities at Richardson Flat (FSP, RMC, 2007b). A Quality Assurance Project Plan (QAPP) is included in the FSP. Sampling and monitoring equipment requirements are presented in the FSP.

6.1 Reclamation

The Site will be inspected bi-annually for a period of two to five years, or until 3 inspections pass with no maintenance work required. Any areas that have failed, washed out, or for any reason do not have vegetative cover capable of preventing soil erosion and dust movement will be reworked and reseeded at the first opportunity, and no later than the next bi-annual inspection. An attempt will be made to determine the cause of the failure and steps will be taken to correct any deficiencies found. The inspections will be made in early spring and early fall so that reseeding can be accomplished in late spring and/or late fall. These inspections and repairs will continue for until reclamation is complete. Location of reclamation monitoring will be determined as Site closure proceeds.

6.1.1 Vegetation

Vegetation monitoring will be conducted bi-annually for a period of two to five years, or until 3 inspections pass with no maintenance work required. Vegetation monitoring will include both permanent and non-permanent transects which will be used for measuring upland and wetland herbaceous vegetation. The point intercept or pin-drop method will be used for both permanent and non-permanent transects. This method is highly

repeatable and measures cover. The non-permanent transects will also include production measurements to determine future stocking rates.

The point intercept or pin-drop consists of dropping a pin every 10.0-cm along a 25.0-m belt transects. This will be accomplished using either a pin-frame or sighting frame, or manually. This method measures cover for individual species, total cover and species composition by cover. Basal cover is measured because it is the most stable for herbaceous communities due to the fact that it does not vary as much due to climatic fluctuations or current year grazing.

For permanent transects, a baseline is established by stretching a measuring tape between two permanent stakes. This baseline needs to be located within a single plant community within a single ecological site, or in this case a seeded graminoid type. Up-close digital photographs of each transect should be taken looking towards the 25.0-m end, as well as a point along the transect that is determined in the field and documented in the field notes. The photograph will document soil surface characteristics and the amount of ground surface covered by vegetation. The photo points will be taken at roughly the same time of year to assist in interpreting changes in vegetation. A paired test can be used in the data analysis to measure significant change in average cover between two sampling points.

For non-permanent transects, transects and methods are the same as permanent transects (see above) however, the site location is determined randomly. Like the permanent transects, these sites need to be found within the same single plant community within a single ecological type. Unlike the permanent transects these transects will change year to year. After collecting cover data, a 1.0-m X 1.0-m frame is placed lengthwise at the 5.0-m and 15.0-m points on the right side of the outstretched tape. Then all perennial herbaceous vegetation that falls within the frame, rooted or not, is identified, clipped and bagged individually by species. These samples will be sent to a lab to be oven-dried at 60°C for 24 hrs to determine air-dry weight and pounds of forage/acre. Because this

technique involves destructive sampling (clipped plots) permanent transects are not recommended.

This design may need to be modified for riparian areas where the area that needs to be sampled is long and narrow. For riparian areas, a Level III survey or Proper Functioning Condition (PFC) assessment will be conducted. Digital photographs should supplement quantitative data monitoring methods. Photographs at least provide a baseline inventory of the landscape and documentation on rates of vegetation change and events associated with that particular change.

Maintenance and repairs will be made based on Site-specific circumstances as required by the results of inspections.

6.1.2 Drainage and Erosion

Drainage inspections will be conducted bi-annually for five years following final reclamation in conjunction with reclamation monitoring detailed in Section 6.1.1. Drainage inspections will be conducted by visually observing all drainage channels, berms and rip-rap areas for damage. Surface conditions outside of drainage areas will be observed during the vegetation inspections described in Section 6.1.1. In addition, inspection of Site drainages will be made after storm events that meet or exceed the design storm return frequency (25y/24h). Repairs will be made based on Site specific circumstances as required by the results of inspections

6.2 Surface Water Quality

Surface water will be monitored following requirements of the SOW, Section 2.2. Surface water monitoring will begin upon completion of remedial activities and will be conducted on a quarterly basis for two years. Field parameters will include pH, temperature and conductivity. Samples will be analyzed at a State of Utah certified

laboratory for cadmium, lead, zinc, and hardness analysis. Surface water sampling procedures are described in the FSP.

The surface water contingency plan will consist of evaluating water chemistry data upon receipt. If there are anomalous data the laboratory reports will be reviewed to ensure that quality assurance/quality control parameters are within specifications and ensure that no transcription errors occurred.

In the unlikely event that water quality standards are exceeded (Site discharge has met applicable water quality standards for the past seven years), an additional sample will be collected to confirm the exceedance. If the exceedance is confirmed, the source will be investigated with additional sampling. When the source is confirmed, corrective action will be consistent with procedures presented in the RD/RA and may include additional capping and/or source removal.

7.0 CONTINGENCY PLAN

In the event of an accident or emergency, countermeasures will be taken to protect the local affected population and environment. The Site is located adjacent to vacant lands and due to the low mobility of Site materials (tailings, sediment and soils) a substantial release that would affect a large population is not expected. Accident and emergency countermeasures should generally be limited to construction worker injury, air release to low population areas and onsite spills of material during Site construction work. Onsite spills should be limited to the amount being carried by individual trucks (10-15 cubic yards) and will remain onsite as materials are only being transported on-site within the Study Area Boundary.

7.1 Spill Control and Countermeasures

In the event of a release, spill or offsite migration of contaminants, appropriate measures will be taken to reduce the potential effects to the local population and environment.

Additional sampling and monitoring may be conducted based on procedures outlined in the FSP. Appropriate regulatory agencies will be notified in the event of a release of contaminated material. If required, sampling, assessment of materials and any necessary removal will be conducted according to procedures outlined in the RD/RA and FSP.

8.0 SCHEDULE

Remedial activities at the Site will be conducted in phases over several years. Reclamation O&M (e.g. vegetation and erosion) will be conducted on completed portions of the Site prior to full Site closure. Surface water monitoring will not be conducted until site reclamation is complete.

9.0 O&M COSTS

O&M costs have not been prepared at the time of this draft report. O&M costs will be borne by United Park.

10.0 REPORTING

O&M activities and the results of routine and opportunity monitoring will be incorporated into the quarterly progress reports for the Site. Reporting will include the results of Site inspections, sample results, corrective actions taken and other applicable Site activities as applicable. Quarterly progress report scheduling is presented in Section 13.0 of the RD/RA (RMC, 2007a).

11.0 CONDITIONS FOR O&M TERMINATION

11.1 Surface Water

Surface water monitoring is scheduled to occur for two years after remediation is complete. Surface water monitoring will be terminated at this time assuming that waters

discharging from the Site continue to meet applicable State of Utah Water Quality Standards.

11.2 Reclamation

Reclamation (e.g. vegetation and erosion) monitoring is scheduled to occur for two to five years after remediation is complete, or until three consecutive inspections indicate that no maintenance is required.

11.3 Institutional Controls

Institutional Controls such as deed restrictions and safe guards for worker safety will remain in-place for the life of the Site.

11.3 Access Control

Access Controls will be required on portions of the Site for the life of the Site.

12.0 REFERENCES

Resource Management Consultants, Inc (RMC), 2007a, Remedial Design Remedial Action Plan, Richardson Flat, Site ID Number: UT980952840

Resource Management Consultants, Inc (RMC), 2007b, Field Sampling Plan, Activities, Richardson Flat, Site ID Number: UT980952840

Resource Management Consultants, Inc (RMC), 2007c United Park Health and Safety Policy, RDRA Activities, Richardson Flat Sit, Site ID Number: UT980952840

Resource Management Consultants, Inc (RMC), 2004, Focused Feasibility Study Report (FS) for Richardson Flat, Site ID Number: UT980952840

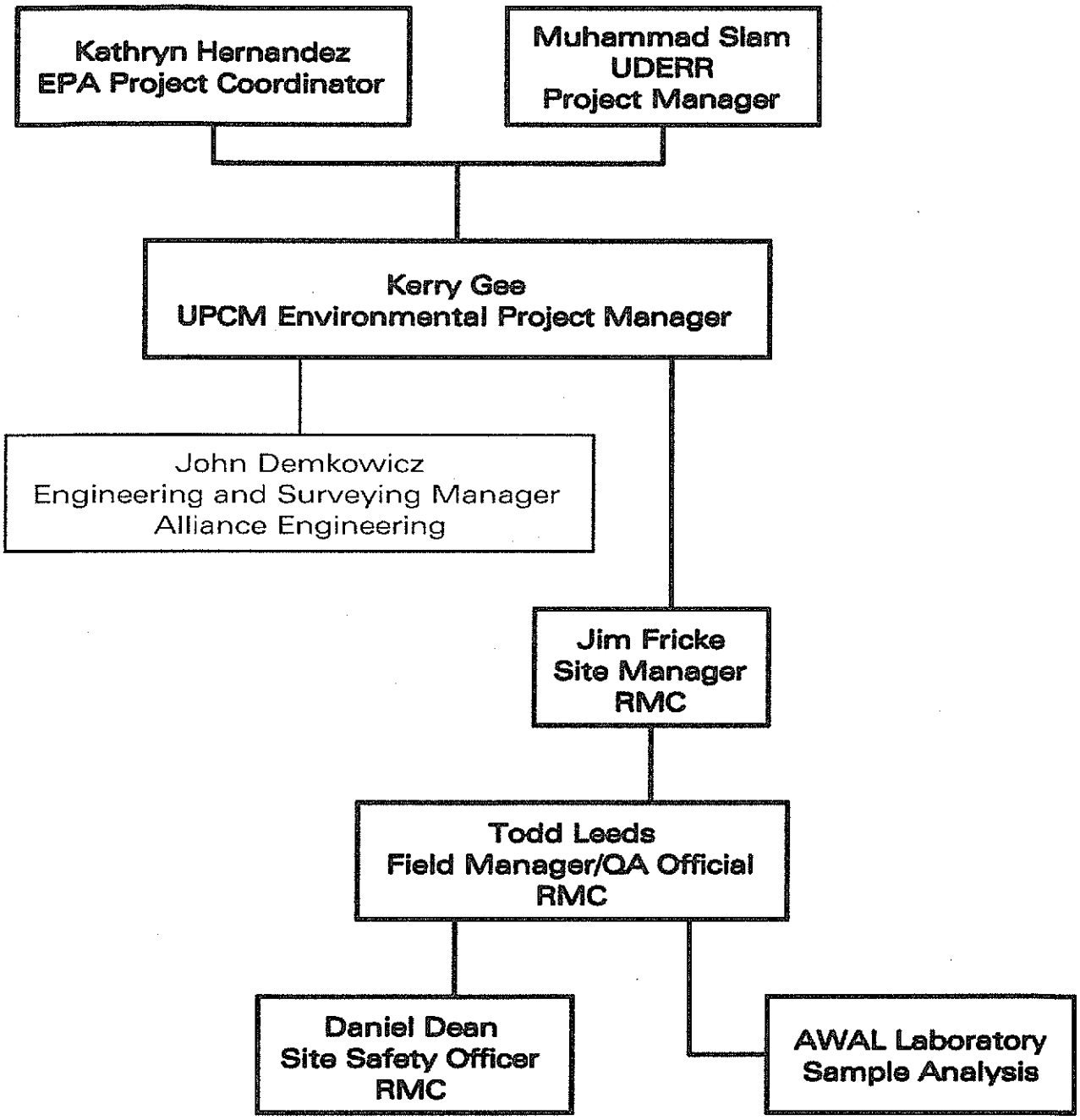
United States Environmental Protection Agency (EPA), 2005, Record of Decision, Richardson Flat Tailings Site.

TABLE 1-1
INSPECTION AND MAINTENANCE SUMMARY

Parameter	Possible Problems	Monitoring Interval	Discontinuation Point
Reclamation (vegetation)	Failed, bare areas, Wash outs	Biannual, spring and fall	2-5 years or until 3 inspections with no work required
Drainage	Wash outs, erosion	Biannual, spring and fall; Every major storm (25 year/24 hour)	2-5 years or until 3 inspections with no work required
Surface Water Quality	Exceedance of State of Utah Water Quality Standards	Quarterly	2 years
Access Control	Trespassing in unauthorized areas	Whenever on-Site	Life of Site

Figures

FIGURE 2-1 - Richardson Flat O & M Organizational Chart



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APPENDIX G

FINAL REMEDIAL SITE INSPECTION CHECKLIST
RICHARDSON FLAT
TASK 1

Inspection Date: _____

Inspector Name: _____ Inspector Name: _____ Inspector Name: _____

Inspector Agency: _____ Inspector Agency: _____ Inspector Agency: _____

Item	Acceptance Criteria	Completion Date	Visually Inspected (Yes/No)	Confirmation Sample Results Meet Criteria (Yes/No)	Number of Confirmation Samples	Further Action Required (Yes/No)	Observations/Comments
Wedge Buttress Completion							
Wedge Buttress Construction	Wedge buttress structurally sound and functioning.			Not Applicable			
Wedge Buttress Reclamation	Vegetative cover functioning.			Not Applicable			
Wedge Buttress Drainage	Drainage system functioning as designed.			Not Applicable			
Area F-1 Cover Placement							
Cover soil Placement	Cover soil minimum thickness is 18"						
Reclamation	Reclamation including vegetative cover and drainage controls are complete and functioning.						
Area F-7 Cover Placement							
Cover Soil Placement	Cover soil minimum thickness is 18"						
Reclamation	Reclamation including vegetative cover and drainage controls are complete and functioning.						

Additional Comments:

FINAL REMEDIAL SITE INSPECTION CHECKLIST
RICHARDSON FLAT
TASK 2

Inspection Date: _____

Inspector Name: _____ Inspector Name: _____ Inspector Name: _____

Inspector Agency: _____ Inspector Agency: _____ Inspector Agency: _____

Item	Acceptance Criteria	Completion Date	Visually Inspected (Yes/No)	Confirmation Sample Results Meet Criteria (Yes/No)	Number of Confirmation Samples	Further Action Required (Yes/No)	Observations/Comments
Area B-2-E Source Removal							
Source removal	All tailings have been removed from area B-2-E.						
Channel reconstruction	Channel reconstruction is complete. Channel is functioning correctly.						
Topsoil placement	Topsoil minimum thickness is 6"						
Reclamation	Reclamation including vegetative cover and drainage controls are complete and functioning.						

Additional Comments:

FINAL REMEDIAL SITE INSPECTION CHECKLIST
RICHARDSON FLAT
TASK 3

Inspection Date: _____

Inspector Name: _____ Inspector Name: _____ Inspector Name: _____

Inspector Agency: _____ Inspector Agency: _____ Inspector Agency: _____

Item	Acceptance Criteria	Completion Date	Visually Inspected (Yes/No)	Confirmation Sample Results Meet Criteria (Yes/No)	Number of Confirmation Samples	Further Action Required (Yes/No)	Observations/Comments
Area B-3-E Source Removal							
Source removal	All source tailings have been removed from area B-3-E.						
Channel reconstruction	Channel reconstruction is complete. Channel is functioning correctly.						
Topsoil placement	Topsoil minimum thickness is 6"						
Reclamation	Reclamation including vegetative cover and drainage controls are complete and functioning.						

Additional Comments:

FINAL REMEDIAL SITE INSPECTION CHECKLIST
RICHARDSON FLAT
TASK 4

Inspection Date: _____

Inspector Name: _____ Inspector Name: _____ Inspector Name: _____

Inspector Agency: _____ Inspector Agency: _____ Inspector Agency: _____

Item	Acceptance Criteria	Completion Date	Visually Inspected (Yes/No)	Confirmation Sample Results Meet Criteria (Yes/No)	Number of Confirmation Samples	Further Action Required (Yes/No)	Observations/Comments
East Half of the South Diversion Ditch Sediment Removal							
Sediment Removal	All contaminated sediments have been removed						
Channel reconstruction	Channel reconstruction is complete. Channel is functioning correctly.						
Topsoil placement	Topsoil, where required, minimum thickness is 6"						
Reclamation	Reclamation including vegetative cover and drainage/flow controls are complete and functioning.						

Additional Comments:

FINAL REMEDIAL SITE INSPECTION CHECKLIST
RICHARDSON FLAT
TASK 5

Inspection Date: _____

Inspector Name: _____ Inspector Name: _____ Inspector Name: _____

Inspector Agency: _____ Inspector Agency: _____ Inspector Agency: _____

Item	Acceptance Criteria	Completion Date	Visually Inspected (Yes/No)	Confirmation Sample Results Meet Criteria (Yes/No)	Number of Confirmation Samples	Further Action Required (Yes/No)	Observations/Comments
Area B-1-W Source Removal							
Source removal	All source tailings have been removed from area B-1-W.						
Channel reconstruction	Channel reconstruction is complete. Channel is functioning correctly.						
Topsoil placement	Topsoil minimum thickness is 6"						
Reclamation	Reclamation including vegetative cover and drainage controls are complete and functioning.						

Additional Comments:

FINAL REMEDIAL SITE INSPECTION CHECKLIST
RICHARDSON FLAT
TASK 6

Inspection Date: _____

Inspector Name: _____ Inspector Name: _____ Inspector Name: _____

Inspector Agency: _____ Inspector Agency: _____ Inspector Agency: _____

Item	Acceptance Criteria	Completion Date	Visually Inspected (Yes/No)	Confirmation Sample Results Meet Criteria (Yes/No)	Number of Confirmation Samples	Further Action Required (Yes/No)	Observations/Comments
West Half of the South Diversion Ditch Sediment Removal							
Sediment Removal	All contaminated sediments have been removed						
Channel reconstruction	Channel reconstruction is complete. Channel is functioning correctly.						
Topsoil placement	Topsoil, where required, minimum thickness is 6"						
Reclamation	Reclamation including vegetative cover and drainage/flow controls are complete and functioning.						

Additional Comments:

FINAL REMEDIAL SITE INSPECTION CHECKLIST
RICHARDSON FLAT
TASK 7

Inspection Date: _____

Inspector Name: _____ Inspector Name: _____ Inspector Name: _____

Inspector Agency: _____ Inspector Agency: _____ Inspector Agency: _____

Item	Acceptance Criteria	Completion Date	Visually Inspected (Yes/No)	Confirmation Sample Results Meet Criteria (Yes/No)	Number of Confirmation Samples	Further Action Required (Yes/No)	Observations/Comments
Diversion Ditch Pond Sediment Removal							
Sediment Removal	All contaminated sediments have been removed						
Channel reconstruction	Channel reconstruction is complete. Channel is functioning correctly.						
Topsoil placement	Topsoil, where required, minimum thickness is 6"						
Reclamation	Reclamation including vegetative cover and drainage/flow controls are complete and functioning.						

Additional Comments:

FINAL REMEDIAL SITE INSPECTION CHECKLIST
RICHARDSON FLAT
TASK 8

Inspection Date: _____

Inspector Name: _____ Inspector Name: _____ Inspector Name: _____

Inspector Agency: _____ Inspector Agency: _____ Inspector Agency: _____

Item	Acceptance Criteria	Completion Date	Visually Inspected (Yes/No)	Confirmation Sample Results Meet Criteria (Yes/No)	Number of Confirmation Samples	Further Action Required (Yes/No)	Observations/Comments
Wetlands Below the Embankment							
Sediment Removal	All contaminated sediments have been removed						
Channel and flow structure recor	Channel and flow structure reconstruction are complete and are functioning correctly.						
Topsoil placement	Topsoil minimum thickness is 6"						
Reclamation	Reclamation including vegetative cover and drainage/flow controls are complete and functioning.						

Additional Comments:

FINAL REMEDIAL SITE INSPECTION CHECKLIST
RICHARDSON FLAT
TASK 9

Inspection Date: _____

Inspector Name: _____ Inspector Name: _____ Inspector Name: _____

Inspector Agency: _____ Inspector Agency: _____ Inspector Agency: _____

Item	Acceptance Criteria	Completion Date	Visually Inspected (Yes/No)	Confirmation Sample Results Meet Criteria (Yes/No)	Number of Confirmation Samples	Further Action Required (Yes/No)	Observations/Comments
Area F-8 Cover Placement							
Cover soil Placement	Cover soil minimum thickness is 18"						
Reclamation	Reclamation including vegetative cover and drainage controls are complete and functioning.						

Additional Comments:

FINAL REMEDIAL SITE INSPECTION CHECKLIST
RICHARDSON FLAT
TASK 10

Inspection Date: _____

Inspector Name: _____ Inspector Name: _____ Inspector Name: _____

Inspector Agency: _____ Inspector Agency: _____ Inspector Agency: _____

Item	Acceptance Criteria	Completion Date	Visually Inspected (Yes/No)	Confirmation Sample Results Meet Criteria (Yes/No)	Number of Confirmation Samples	Further Action Required (Yes/No)	Observations/Comments
Area F-4 Cover Placement							
Cover soil Placement	Cover soil minimum thickness is 18"						
Reclamation	Reclamation including vegetative cover and drainage controls are complete and functioning.						
Area F-5 Cover Placement							
Cover Soil Placement	Cover soil minimum thickness is 18"						
Reclamation	Reclamation including vegetative cover and drainage controls are complete and functioning.						

Additional Comments:

FINAL REMEDIAL SITE INSPECTION CHECKLIST
RICHARDSON FLAT
TASK 11

Inspection Date: _____

Inspector Name: _____ Inspector Name: _____ Inspector Name: _____

Inspector Agency: _____ Inspector Agency: _____ Inspector Agency: _____

Item	Acceptance Criteria	Completion Date	Visually Inspected (Yes/No)	Confirmation Sample Results Meet Criteria (Yes/No)	Number of Confirmation Samples	Further Action Required (Yes/No)	Observations/Comments
Area F-7a Cover Placement							
Cover soil Placement	Cover soil minimum thickness is 18"						
Reclamation	Reclamation including vegetative cover and drainage controls are complete and functioning.						
Area F-6 Cover Placement							
Cover Soil Placement	Cover soil minimum thickness is 18"						
Reclamation	Reclamation including vegetative cover and drainage controls are complete and functioning.						

Additional Comments:

FINAL REMEDIAL SITE INSPECTION CHECKLIST
RICHARDSON FLAT
TASK 12

Inspection Date: _____

Inspector Name: _____ Inspector Name: _____ Inspector Name: _____

Inspector Agency: _____ Inspector Agency: _____ Inspector Agency: _____

Item	Acceptance Criteria	Completion Date	Visually Inspected (Yes/No)	Confirmation Sample Results Meet Criteria (Yes/No)	Number of Confirmation Samples	Further Action Required (Yes/No)	Observations/Comments
Area F-2 Cover Placement							
Cover soil Placement	Cover soil minimum thickness is 18"						
Reclamation	Reclamation including vegetative cover and drainage controls are complete and functioning.						
Area F-3 Cover Placement							
Cover Soil Placement	Cover soil minimum thickness is 18"						
Reclamation	Reclamation including vegetative cover and drainage controls are complete and functioning.						

Additional Comments:

FIELD CONSTRUCTION PLAN
FOR
RICHARDSON FLAT TAILINGS SITE

EPA SITE ID: UT980952840

December 14, 2007

Prepared for:

United Park City Mines
P.O. Box 1450
Park City, UT 84060

Prepared by:

Resource Environmental Management Consultants d.b.a. RMC
8138 South State Street, Suite 2A
Midvale, Utah 84047

Phone: (801) 255-2626
Fax: (801) 255-3266

FILED CONSTRUCTION PLAN
FOR
RICHARDSON FLAT TAILINGS SITE

EPA SITE ID: UT980952840

December 14, 2007

Prepared for:

United Park City Mines
P.O. Box 1450
Park City, UT 84060

Prepared by:_____ Date:
Jim Fricke
Resource Management Consultants

Reviewed by:_____ Date:
Kerry Gee
United Park City Mines Company

Reviewed by: _____ Date:
Kathryn Hernandez
USEPA Remedial Project Manager

Table of Contents

List of Figures

1.0 INTRODUCTION

This Field Construction Plan (FCP) details the construction components, stormwater management and procedures and completion milestones to be undertaken for each construction task. The tasks are required to complete the selected remedial remedy approved by the United States Environmental Protection Agency (EPA) at the Richardson Flat Tailings Site, Site ID UT980952840, (The "Site") near Park City, Utah.

A full description of Site background, investigative history, specifications, health and safety, design elements, project management and construction procedures are presented in the Remedial Design and Remedial Action Work Plan (RD/RA, RMC 2007a). The FCP is intended to act as a planning supplement to the RD/RA with a focus on stormwater runoff protection.

1.1 Remedy Description and Overview

The selected remedy addresses mill tailings located in several areas of the Site, including the main impoundment (Area A), an area south of the diversion ditch (tailings south of the diversion ditch – Area B), and the wetlands west of the embankment. Other media addressed in the selected remedy are sediments and surface water located within the Site boundary. The mill tailings and other media are not considered principal threat waste; therefore, appropriate remedial actions for the waste include excavation of tailings in source areas with relocation to areas within the impoundment and containment of the tailings through capping. Additionally, the selected remedy allows for future disposal of Bevill-exempt mine waste from other remediation areas within the Park City area on the tailings impoundment and placement of restrictions on future land and groundwater use.

The remedy detailed in this RD/RA is specified in the Record of Decision (ROD). The selected remedial alternative contains the following elements:

- Removal of contaminated materials in selected areas south of the South Diversion Ditch (Area B) where tailings may be in contact with surface water or shallow groundwater. Excavation will extend to the visual interface between the tailings and native soils or to a depth where a clay soil cover can be placed;
- Removal of contaminated materials in the wetland west of the main embankment. This would include excavation of contaminated material to achieve the Site PRG of 310 parts per million (ppm) lead. This activity will only be performed after remedial activities are completed in the South Diversion Ditch;
- Placing excavated materials in the impoundment. The impoundment will be used by United Park and others to accommodate similar Bevill-exempt mine waste in the upper Silver Creek watershed;
- Placement of a minimum twelve inches of low permeability soil cover on areas where tailings are left in-place, including the impoundment. The cover will be machine compacted. Upon completion of the low permeability soil cover, a six-inch topsoil cover will be placed. The final surface cover will be a minimum of eighteen inches thick and the surface will be graded to control surface stormwater runoff and drainage;
- Placement of twelve-inches of clean gravel over contaminated sediments in the South Diversion Ditch, including the pond located near the terminus of the ditch. Additional discussions with EPA and in consideration of potential Natural Resource Damages UPCM may remove contaminated sediments in the ditch and pond;
- Installation of a rock wedge buttress along the oversteepened portion of the embankment for about 400 feet of the total embankment length of 800 feet;
- Regrading and revegetation of areas affected by remediation at the Site. Areas in which tailings are removed will be restored, where possible, to pre-tailings topographic conditions; and
- Monitoring Site conditions (vegetation and erosion) on a bi-annual basis for two to five years. Surface water will be monitored for total and dissolved cadmium and zinc on a quarterly basis for two years.

2.0 Construction Phasing

A Construction Task Plan is presented in Figure 2-1. As described in the RD/RA, the construction activities are divided into nine sequential work tasks which are based on geographic areas and the proposed work progression to be followed at the Site (e.g. Task 1 will be competed prior to Task 2). Construction tasks are grouped in yearly construction phases according to anticipated annual workloads and will be conducted according to the Construction Phasing Plan that is presented in Figure 2-2. Multiple tasks may be constructed concurrently if the work does not impact another task area. The work progression will generally follow an upstream to downstream progression. This will insure that remediated areas are not recontaminated by upstream sources.

3.0 Stormwater Management

Stormwater management will be conducted to:

- Reduce the potential for offsite migration of sediments, soil and tailings; and
- Eliminate the re-contamination of areas that have been covered or have undergone source removal.

General stormwater management elements include:

- Berms, wattle and silt fencing as required to prevent the migration of materials from work areas. These elements may remain in-place until revegetation efforts are complete;
- Sediment barriers in the South Diversion Ditch, pond and wetland to capture sediment and prevent downstream off-site migration. These in-flow barriers may include a combination of, filter fabric, drop structures and/or temporary retention structures.
- Stormwater runoff protection measures will remain in-place until revegetation efforts are complete;
- Sediment basins will be constructed on an as-needed basis;

- General grading to direct potential stormwater runoff to sediment basins and traps as needed;
- Hay or straw bale barriers will be placed in appropriate ephemeral channel features that drain from work areas. The hay bales will be placed downgradient from the silt fence or wattle barrier; and
- A supply of hay or straw bales and wattle material will be stored onsite during Remedial Action construction.

General procedures to reduce the tracking of contaminated materials into un-contaminated areas will include:

- All trucks and equipment working in contaminated materials (e.g. tailings and sediments) will be decontaminated prior to working with clean materials; Decontamination procedures are described in Section 11.8 of the RD/RA;
- A stabilized construction entrance will be used, if necessary, to remove gross contamination for trucks hauling tailings;
- All trucks and equipment will be decontaminated prior to leaving the site and/or moving from contaminated to clean work areas; and
- Dust control will be conducted as necessary as described in Section 11.1.1 of the RD/RA.

4.0 Work Tasks

This section describes the individual construction elements and procedures required to complete each Work Task. Work for each task will be conducted to reach the milestones listed for each task (e.g. the task is complete when all of the milestones are met). Specifications and work procedures are described in the RD/RA.

4.1 Work Task 1

Work involved in Task 1:

1) Construction of the Wedge Buttress; and
2) Cover placement, grading, confirmation sampling, erosion control structure placement and revegetation in areas F-1 and F-7 (Figure 2-1).

Stormwater runoff protection elements to be implemented prior to and during construction will include:

- Silt fence or wattle will be placed below the Wedge Buttress construction area. The silt fence or wattle will prevent the migration of soils into the wetland area;
- Berm and wattle (if required) on the south side of the construction zones in areas F-1 and F-7. The berm and wattle (if required) will prevent the migration of tailings and soils into the South Diversion Ditch. The work in this area consists of placing rock cover and hence, the potential for tailings migration is minimal; and
- Sediment barriers will be placed as needed at the culvert crossing and the downstream end of the South Diversion Ditch directly above the pond. This barrier will prevent the downstream migration of any sediment that has inadvertently migrated into the South Diversion Ditch and will remain in-place for the duration of the Remedial Action.

Task 1 Milestones:

1) Completion of the Wedge Buttress;
2) Cover Placement in areas F-1 and F-7 (Figure 2-1) is complete;
3) Collect confirmation samples and verify cover installation meets specifications; and
4) Reclamation (surface grading and drainage control) is complete.

4.2 Work Task 2

Work involved in Task 2:

1) Source removal, grading, confirmation sampling, topsoil placement, channel reconstruction and revegetation in area B-2-E (Figure 2-1).

Stormwater runoff protection elements to be implemented prior to and during construction will include:

- Silt fence or wattle will be placed along the eastern, downgradient side of the excavation area. The silt fence or wattle will prevent the migration of tailings and soils from the work zone. The silt fence or wattle will remain in place until revegetation efforts are complete;
- The raised elevation of the county road will prevent the migration of soil and tailings to the south; and
- The reconstructed pond will act as a sediment detention pond for all work south of the county road. Sediments entering the pond will not be contaminated;
- Hay bale barriers will be placed in ephemeral channels that drain from the work zone. The hay bales will be placed downgradient from the silt fence or wattle barrier.
- A sediment barrier may be placed at the culvert that passes below the county road.

Task 2 Milestones:

1) Source removal in area B-2-E is complete;
2) Confirmation samples have been collected and verify source removal;
3) Channel reconstruction and topsoil placement are complete; and
4) Reclamation (surface grading drainage control and revegetation) is complete.

4.3 Work Task 3

Work involved in Task 3:

1) Source removal, grading, confirmation sampling, topsoil placement, channel reconstruction and revegetation in area B-3-E (Figure 2-1).

Stormwater runoff protection elements to be implemented prior to and during construction will include:

- Silt fence or wattle will be placed along northern portion of the work zone along the South Diversion Ditch. The silt fence or wattle will prevent the migration of tailings

and soils from the work zone into the ditch. The silt fence or wattle will remain in place until revegetation efforts are complete;

- The raised elevations of the county road will prevent the migration of soil and tailings to the south; and
- Hay bale barriers will be placed in ephemeral channels that drain from the work zone. The hay bales will be placed downgradient from the silt fence or wattle barrier.

Task 3 Milestones:

1) Source removal in area B-3-E is complete;
2) Confirmation samples have been collected and verify source removal;
3) Channel reconstruction and topsoil placement are complete; and
4) Reclamation (surface grading, drainage control and revegetation) is complete.

4.4 Work Task 4

Work involved in Task 4:

1) Sediment removal, grading, confirmation sampling, topsoil placement, erosion material/structures placement and revegetation of the east portion of the South Diversion Ditch (Figure 2-1) upstream from the current culvert crossing.

Stormwater runoff protection elements to be implemented prior to and during construction will include:

- Sediment barriers placed during Task 1 at the culvert crossing and the downstream end of the South Diversion Ditch directly above the pond. These barriers will prevent the downstream migration of any material during sediment removal and will remain in-place for the duration of the Remedial Action.

Task 4 Milestones:

1) Sediment removal in the eastern half of the South Diversion Ditch is complete;
2) Confirmation samples have been collected and verify sediment removal;

3) Channel reconstruction is complete; and
4) Reclamation (topsoil placement, channel grading, drainage control and revegetation) is complete.

4.5 Work Task 5

Work involved in Task 5:

1) Source removal, grading, confirmation sampling, topsoil placement, channel reconstruction and revegetation in area B-1-W (Figure 2-1).

Stormwater runoff protection elements to be implemented prior to and during construction will include:

- Silt fence or wattle will be placed along northern portion of the work zone along the South Diversion Ditch. The silt fence or wattle will prevent the migration of tailings and soils from the work zone into the ditch. The silt fence or wattle will remain in place until revegetation efforts are complete; and
- The sediment barrier placed at the downstream end of the SDD, above the pond, as described in Task 1.
- Hay bale barriers will be placed in ephemeral channels that drain from the work zone. The hay bales will be placed downgradient from the silt fence or wattle barrier.

Task 5 Milestones:

1) Source removal in area B-1-W is complete;
2) Confirmation samples have been collected and verify source removal;
3) Topsoil placement is complete; and
4) Reclamation (surface grading, drainage control and revegetation) is complete.

4.6 Work Task 6

Work involved in Task 6:

1) Sediment removal, grading, confirmation sampling, cover soil placement, erosion material/structures placement and revegetation of the west portion of the South Diversion Ditch (Figure 2-1) upstream from the Diversion Ditch Pond to the culvert crossing.

Stormwater runoff protection elements to be implemented prior to and during construction will include:

- Sediment barriers placed during Task 1 at the culvert crossing and the downstream end of the SDD directly above the pond. These barriers will prevent the downstream migration of any sediment that has inadvertently migrated into the South Diversion Ditch and will remain in-place for the duration of the Remedial Action.
- The sediment barrier at the downstream end of the SDD will be the primary protection for this Task.

Task 6 Milestones:

1) Sediment removal in the western half of the South Diversion Ditch is complete;
2) Confirmation samples have been collected and verify sediment removal;
3) Channel reconstruction is complete; and
4) Reclamation (channel grading, drainage control and revegetation) is complete.

4.7 Work Task 7

Work involved in Task 7:

1) Sediment removal, grading, confirmation sampling, cover soil placement, erosion material/structures placement and revegetation of the Diversion Ditch Pond (Figure 2-1).

Stormwater runoff protection elements to be implemented prior to and during construction will include:

- Sediment barriers will be placed on the downstream side of the pond and upstream of the adjacent wetland; and
- Sediment barriers will be placed on the downstream side of the wetland above and/or below the culvert that flows beneath Highway 248. These barriers will be the final catch-all for the Site.

Task 7 Milestones:

1) Sediment removal in the Diversion Ditch Pond is complete;
2) Confirmation samples have been collected and verify sediment removal;
3) Pond reconstruction is complete; and
4) Reclamation (grading, drainage control and revegetation) is complete.

4.8 Work Task 8

Work involved in Task 8:

1) Sediment removal, grading, confirmation sampling, cover soil placement, wetland construction, erosion material/structures placement and revegetation of the Wetlands below the main embankment (Figure 2-1).

Stormwater runoff protection elements to be implemented prior to and during construction will include:

- The sediment barriers installed during Task 7 and placed on the downstream side of the wetland above and below the culvert that flows beneath Highway 248; and
- Intermediate sediment barriers will be placed within the wetland work areas on an as-needed basis.
- A sediment pond will be constructed at the downstream end of the wetland.

Task 8 Milestones:

1) Sediment removal in the Wetlands below the Embankment is complete;
2) Confirmation samples have been collected and verify sediment removal;

3) Wetland reconstruction is complete; and
4) Reclamation (grading and revegetation) is complete.

4.9 Work Task 9

Work involved in Task 9:

1) Cover placement, grading, confirmation sampling, erosion control structure placement and revegetation in area F-8 (Figure 2-1).

Stormwater runoff protection elements to be implemented prior to and during construction will include:

- Berm and wattle (if required) separating the work areas from areas in which construction has been completed. This is a low lying area and will remain at a lower elevation than the rest of the impoundment. Therefore, stormwater run-off should not be a concern. The berm and wattle (if required) will prevent the migration of tailings and soils into completed areas. The berm and wattle will remain in place until revegetation efforts are complete. The work in this area consists of placing soil cover and hence, the potential for tailings migration is minimal.

Task 9 Milestones:

1) Cover Placement in area F-8 (Figure 2-1) is complete;
2) Confirmation samples have been collected and verify cover placement meets specifications; and
3) Reclamation (surface grading, drainage control and revegetation) is complete.

4.10 Work Task 10

Work involved in Task 10:

1) Cover placement, grading, confirmation sampling, erosion control structure placement and revegetation in areas F-4 and F-5 (Figure 2-1).

Stormwater runoff protection elements to be implemented prior to and during construction will include:

- Berm and wattle (if required) separating the work areas from areas in which construction has been completed. The berm and wattle (if required) will prevent the migration of tailings and soils into completed areas. The berm and wattle will remain in place until revegetation efforts are complete. The work in this area consists of placing soil cover and hence, the potential for tailings migration is minimal.
- A berm and wattle will be placed in areas adjacent to the SDD. Remediation of the SDD will be completed prior to final covering and grading of the Impoundment Task 10 areas.

Task 10 Milestones:

1) Cover Placement in areas F-4 and F-5 (Figure 2-1) is complete;
2) Confirmation samples have been collected and verify cover placement meets specifications; and
3) Reclamation (surface grading, drainage control and revegetation) is complete.

4.11 Work Task 11

Work involved in Task 11:

1) Cover placement, grading, confirmation sampling, erosion control structure placement and revegetation in areas F-7a and F-6 (Figure 2-1).

Stormwater runoff protection elements to be implemented prior to and during construction will include:

- Berm and wattle (if required) separating the work areas from areas in which construction has been completed. The berm and wattle (if required) will prevent the migration of tailings and soils into completed areas. The berm and wattle will remain in place until revegetation efforts are complete. The work in this area consists of placing soil cover and hence, the potential for tailings migration is minimal.

- A berm and wattle will be placed in areas adjacent to the SDD. Remediation of the SDD will be completed prior to final covering and grading of the Impoundment Task 11 areas.

Task 11 Milestones:

1) Cover Placement in areas F-7a and F-6 (Figure 2-1) is complete;
2) Confirmation samples have been collected and verify cover placement meets specifications; and
3) Reclamation (surface grading, drainage control and revegetation) is complete.

4.12 Work Task 12

Work involved in Task 9:

1) Cover placement, grading, confirmation sampling, erosion control structure placement and revegetation in areas F-2 and F-3 (Figure 2-1).

Stormwater runoff protection elements to be implemented prior to and during construction will include:

- Berm and wattle (if required) separating the work areas from areas in which construction has been completed. The berm and wattle (if required) will prevent the migration of tailings and soils into completed areas. The berm and wattle will remain in place until revegetation efforts are complete. The work in this area consists of placing soil cover and hence, the potential for tailings migration is minimal.
- A berm and wattle will be placed in areas adjacent to the SDD. Remediation of the SDD will be completed prior to final covering and grading of the Impoundment Task 12 areas.

Task 12 Milestones:

1) Cover Placement in areas F-2 and F-3 (Figure 2-1) is complete;
2) Confirmation samples have been collected and verify cover placement meets specifications; and

3) Reclamation (surface grading, drainage control and revegetation) is complete.

5.0 REFERENCES

Resource Management Consultants, Inc (RMC), 2007a, Remedial Design/Remedial Action Plan (RD/RA), Richardson Flat, Site ID Number: UT980952840, With Attached Work Plan.

Resource Management Consultants, Inc (RMC), 2007b, Field Sampling Plan, Remedial Investigation, Richardson Flat, Site ID Number: UT980952840, With Attached Work Plan.

Resource Management Consultants, Inc (RMC), 2007c, Health and Safety Policy, Remedial Investigation, Richardson Flat, Site ID Number: UT980952840, With Attached Work Plan.

Figures